

THE IRON AGE

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Reading Matter Contents.....page 47
Alphabetical Index to Advertisers " 227
Classified List of Advertisers.... " 219
Advertising and Subscription Rates " 226



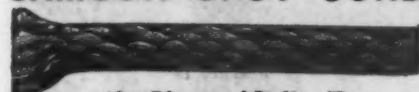
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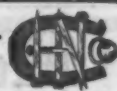
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THE IRON AGE

THURSDAY, JUNE 2, 1904.

The Hudson River Tunnel. - I.

A Comparison of the Original Methods with Those Now Employed.

BY S. D. V. BURR.

The late De Witt C. Haskin certainly demonstrated the strength of his convictions when he began operations upon the tunnels under the Hudson River connecting New York and Jersey City, and which are now rapidly nearing completion. His plans were scoffed at and ridiculed by engineers whose opinions influenced capital. They pronounced the scheme impracticable and extremely

Tunneling with an Unprotected Heading.

The most remarkable feature of this plan was its extreme simplicity. The heading was divided into steps, or terraced, and upon these steps the men stood while shoveling out the silt, which was thrown back into the completed section. After sufficient space had been excavated a plate was inserted and bolted to the ones already in place. This work was commenced at the crown and carried down each side to the invert. The plates down the sides conformed to the shape of the heading, so that the iron work resembled an exaggerated buggy top. When four complete rings, or 10 feet, had been finished, the section was cleaned out and the masonry laid. This was of hard burned brick in hydraulic



Fig. 1.—View Looking Toward Heading, Showing Centering and Radial Bracing of Plates.—The Track in the Center is Placed Directly Upon the "Pilot."

hazardous, and for several years would have nothing to do with the undertaking. It was only after Mr. Haskin had conclusively proved that he could build a subaqueous tunnel through soft material, without a shield and without any protection whatever except that afforded by the mud itself, that engineers began to be less skeptical and to acknowledge that there might, perhaps, be something in the idea. He showed that it was possible to maintain such a balance between the air pressure within the tunnel and the water pressure without that a very slight barrier or partition would serve to keep the two apart. This barrier was formed by the mud itself, with absolutely no assistance from plates or sheathing. That the method was feasible is to-day demonstrated by several hundred feet of tunnel that were constructed in accordance with it.

This work was done by Mr. Haskin with his own money and before he endeavored to obtain outside capital. He proved the soundness of his judgment, and when his own money—several hundred thousand dollars—had been expended he brought in other capital.

cement, and at first was 2 feet thick; this was afterward increased to 30 inches where the tunnel approached the deepest part.

The plates were of $\frac{1}{4}$ -inch boiler iron, and all were $2\frac{1}{2}$ wide, but some were 3 feet long and others 6 feet. A 3-inch angle iron flange, pierced with holes every 6 inches, was formed around each plate. As the plates were put in they were braced from the bottom by timbers resting upon sleepers inserted in the silt. After the men had become accustomed to the work it was found possible to build an average of 5 feet a day. This was better than the progress made when the shield was first used.

It is now expedient to mention some of the first work done, much of which was of a temporary character and was not made permanent until about 300 feet of tunnel had been finished.

First Work.

The first work, after borings had been made across the river in line of the tunnel, was the sinking of a circular brick shaft, 30 feet inside diameter by 4 feet thick, to a depth of 60 feet below the river surface. At a point on the

river side 29 feet below the surface an opening was made to receive an air lock 15 feet long by 6 feet in diameter. It now became necessary to carry the excavation from the inner end of the lock down to the 60-foot level. A very small space was dug at the top of the inner or forward end of the lock, and a flanged iron plate put in position; side plates were added until a ring had been finished. Successive rings were added, but each ring was made larger than its predecessor, so that the whole resembled a funnel having a straight top and a bottom formed of steps. The top and bottom of the last or largest ring were in line with the top and bottom of the tunnel. At this time it was proposed to build one single track tunnel, 24 feet high by 26 feet wide, but this was afterward changed, and two tunnels were started, 18 by 16 feet in diameter.

After both tubes had been dug for some distance it was decided to remove the temporary entrance and make permanent connection with the shaft. The work was progressing with apparent safety when a blow-out oc-

that they would settle to the right level. Sometimes they would, but more often they would not. Since there was no way of ascertaining the consistency of the material in advance of the heading, the amount of settlement of the supports could not be calculated. This led to the introduction of the

"Pilot,"

by John F. Anderson, then superintendent of the tunnel. This consisted of a tube of $\frac{1}{4}$ -inch boiler iron, made up of interchangeable plates 22 inches wide by 4 feet long, having angle irons around the edges. This was 6 feet in diameter and 50 to 60 feet in length. The forward end was extended beyond the heading some distance into the silt, by which it was firmly held. The tube projected through the unfinished section into the completed work, where it was supported by radial struts against the masonry. By this means a rigid foundation was obtained, from which the plates could be held with certainty during the laying of the brick work. An additional advantage was that the direction could be changed at



Fig. 2.—Looking Down the Shaft at the West End.—The Air Lock in Which 20 Men Were Killed Is Shown Suspended at the Left.—It Was Originally Placed in the Wall Just Above the Three Men.

curred in 1880. The leak was at the junction of the entrance and shaft, and took place during a shift. Eight men had entered the lock and 20 were on the way. The falling *débris* blocked the inner door so that it could be neither opened nor closed, and yet the space was not sufficient to permit entrance to the lock. When it was certain the door could not be moved the bullseye in the front end was smashed. The pressure inside was soon reduced to normal, when the first door was opened and the eight men in the lock escaped, but their comrades were all drowned.

The work was reopened by sinking a caisson covering the space between the shaft and finished tunnels. The air lock was then removed; it is shown suspended from the frame in Fig. 2.

Impossible to Keep to Grade.

A difficulty of the most serious nature was met during the early stages of the work. It was found to be impossible to maintain the proper grade. The silt varied in compactness, and therefore the supports for the plates did not always provide the same resistance. This caused unequal settling before the masonry could be placed. The consequence was that for the first 300 or 400 feet of the north tunnel the line assumed its own elevations, irrespective of the desires of the engineers.

An attempt was made to overcome this by placing plates higher than they should be, with the expectation

will. The operation of the pilot will be understood from the sections, Fig. 7, and the appearance of the heading from the half-tones, Figs. 1 and 5. The pilot was used for the building of several hundred feet of tunnel, or until the English engineers, Messrs. Fowler and Baker, assumed charge, when the shield method was employed. This method has been continued by the present engineers.

Without the pilot the tunnel would never have been built as far as it was—in accordance with the original plans—and work would, of necessity, have been abandoned. The first few hundred feet of the north tunnel indicated what was to be expected as the work progressed. It would be useless to continue a tunnel which was bound to assume its own grades, irrespective of what the engineer thought proper. It was, of course, known that these faults could be corrected after completion, and that, while the job would be expensive, it would present no serious difficulty from an engineering standpoint, since all the work would be at the invert of the tunnel.

The unprotected heading did not enter the problem. The work had been, and was still to be, carried on successfully by this plan, which if expedient at small depths would be equally so at greater depths provided the material passed through remained the same. In fact, the unprotected heading was still used when the air reached a pressure of 36 to 38 pounds to the square inch. The photograph Fig. 1 was taken under the latter pressure.

Watching for Air Leaks.

Before the adoption of the shield it was necessary to continuously and carefully watch the entire exposed surface of silt for leaks. A large opening could be detected

river. This depression was filled with bundles of hay weighted with stone and then covered with earth, the whole then being allowed to settle for a few days. The heading was then pushed through the obstruction in the

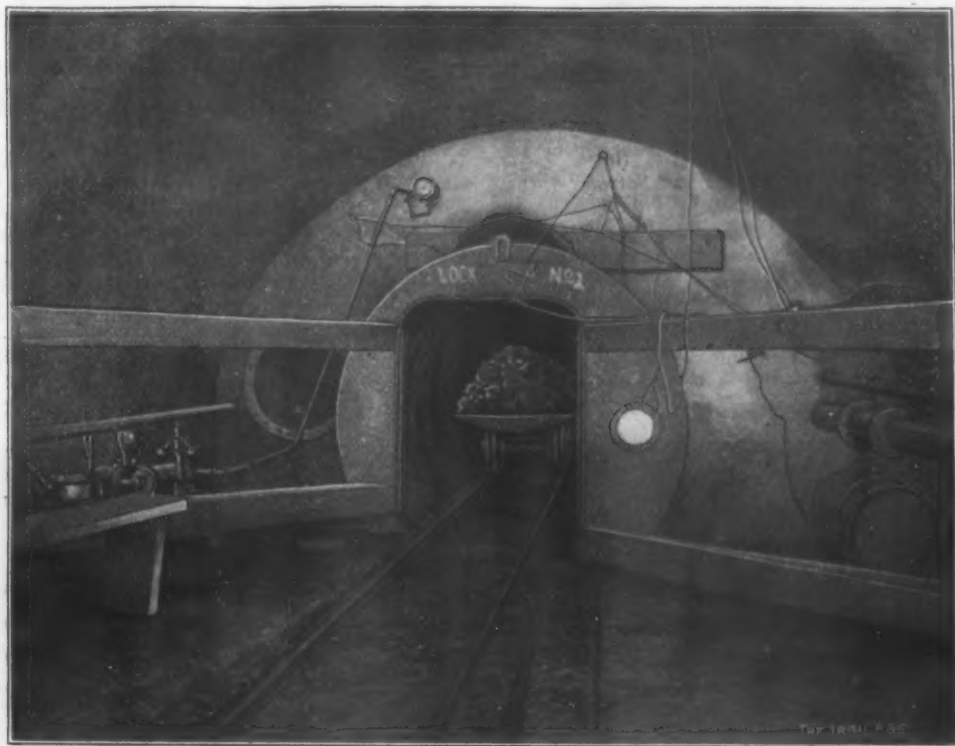


Fig. 3.—Lock No. 1.—The Timber Lock is Shown at the Left.

by the noise made by the outrushing air and a small one by passing a candle over the surface, when the air would draw the flame into the most minute hole. A handful of silt acted as a stopper.

usual way, the men for a long time digging out sand, silt, rock and fodder.

In the case of a pocket the action of the air was intermittent. At first the air flowed out until the pressure



Fig. 4.—Removing Lock No. 1.

Pockets of loose material, like sand, were sometimes met in the line of the tunnel. When small these occasioned little difficulty, but when large they were more than once the cause of flooding the tunnel. In one such break the silt and sand completely filled the heading and formed a considerable depression in the bed of the

of the water became excessive, when the water flowed in. Then the pressure of the water became the greater and it escaped, this alternating movement continuing until the tunnel had been filled. It will be readily understood that those movements consumed considerable time, which was most fortunate for the men, as it gave them an op-

portunity of reaching the lock in advance of the water and thus escape. In no case was a man killed by reason of a blowout at the heading.

Silt.

In its physical characteristics silt resembles both clay and quicksand, paradoxical as this may appear. When it carries just the right amount of water it is stiff, compact and tenacious to a certain degree. With an excess of water it runs like quicksand and is just about as hard to control. It is very evident that with a material of this kind constituting the heading of a subaqueous tunnel it became of the greatest importance to maintain, as accurately as possible, a true equilibrium between the hydrostatic head without the tunnel and the air pressure within. But this could not be done over the entire area of the heading, for the reason that while the air pressure was the same at all points, the water pressure varied according to the depth. As the excavation was about 23 feet from the crown to the invert, there was a difference of about 10 pounds between the pressure of the

of their retreat; but, above all, their eyes convinced them that there was nothing but a wall of mud between them and the Atlantic. They were aware that this mud would run like quicksand if it carried the proper amount of moisture, and the knowledge that it was a comparatively stable material under correct conditions did not relieve their anxiety. The first visit was always like a call of ceremony—as brief as it could conveniently be made.

Working Through Sand and Gravel at the New York End.

The nature of the material at the eastern, or New York, end was radically different from that encountered upon the New Jersey side. When at the required depth the caisson rested entirely in sand and gravel, which presented no barrier to the passage of air, and consequently prohibited the adoption of the method employed in the silt. After the two tunnels had been started from the side of the caisson work was commenced at the crown of the bulkhead at the heading. This bulkhead was of $\frac{1}{4}$ -inch plates, flanged, and braced against the caisson.



Fig. 5.—View Looking from the Heading, Showing Bracing, Centering and Top of Pilot.

water at the top and bottom. Since it was impossible to balance the inside and outside pressures at all points of the exposed surface, it was necessary to assume an air pressure somewhere between the water pressure at the top and bottom of the excavation. This, which may be termed the critical point, was found to be about one-third from the top to the bottom. Above this the air pressure was in excess and gradually forced the water out of the silt, leaving the latter in a more or less dry condition and with a tendency to flake off. Below this the water pressure was the greater, and the silt, being too wet, was apt to run. The latter aspect was not thought to be dangerous, and therefore only the upper portion was watched carefully and constantly, as stated above.

The foregoing merely gives the main points of the methods introduced under the direction of Mr. Haskin. The experiment—for such it really was—was successful. At this date the plan is interesting only as an experiment, and not because it marked a radical and important advance in tunnel construction. It is safe to predict that it will never be tried again.

Engineers upon their first visit to the heading all had the same feeling of insecurity. They knew they were at least 80 feet below the surface of the river; they knew there was solid masonry and a strong air lock in the line

The crown plate was removed, and enough material was excavated to admit a small plate, which was bolted to those already in. This work was carried forward and down each side as far as possible before the next row of horizontal plates in the bulkhead was removed. When the crown had been extended 10 feet a second bulkhead of plates was begun. The removal of the plates from the first bulkhead was so timed that the upper edge of this bulkhead was always kept at a higher elevation than the lower edge of the advance bulkhead. The chamber thus formed was exactly like the compartments of the ordinary shield and served precisely the same purpose. As long as the air pressure was maintained it was impossible for water to enter the tunnel, owing to the difference in level of the horizontal edges of the two bulkheads.

As soon as a section of 10 feet had been entirely lined with iron plates it was cleaned out and the brickwork laid.

As already mentioned, the sand and gravel offered no impediment to the escape of air. To overcome this difficulty cement was forced into the sand at the spot where it was intended to excavate for a plate. Afterward, silt brought from the other side was used for this purpose, and it filled all requirements admirably. Wet silt spread over a patch of exposed sand made it practically imper-

vious to air. Leaks were also closed with a handful of silt. In this way the north tunnel was finished for a distance of nearly 200 feet from the caisson.

Photographing Seventeen Years Ago.

The photographer of to-day, with his wonderful facilities for producing a powerful light having the highest actinic quality, and with his rapid lens and quick plates, cannot estimate the troubles of "the crank" in 1887. In that year the writer made many attempts before even an image of any kind was obtained. The surroundings were disadvantageous. The wet silt, which covered everything

ribbon. Flash powders, lamps, pistols, cards and so on were not known in those days. Experiments were first made to see if the smoke of the burning ribbon would have a harmful effect upon the men. The results were most satisfactory. The ribbon was fed from a reel through an opening in the center of a reflector. With this apparatus the views in the heading, Figs. 1 and 5, were taken, the exposure in the first case being about ten minutes and in the second about four minutes. The views Figs. 3 and 4 were made by burning magnesium ribbon in pieces about 2 feet long, hung on a wire stretched across the tunnel just behind the camera. The

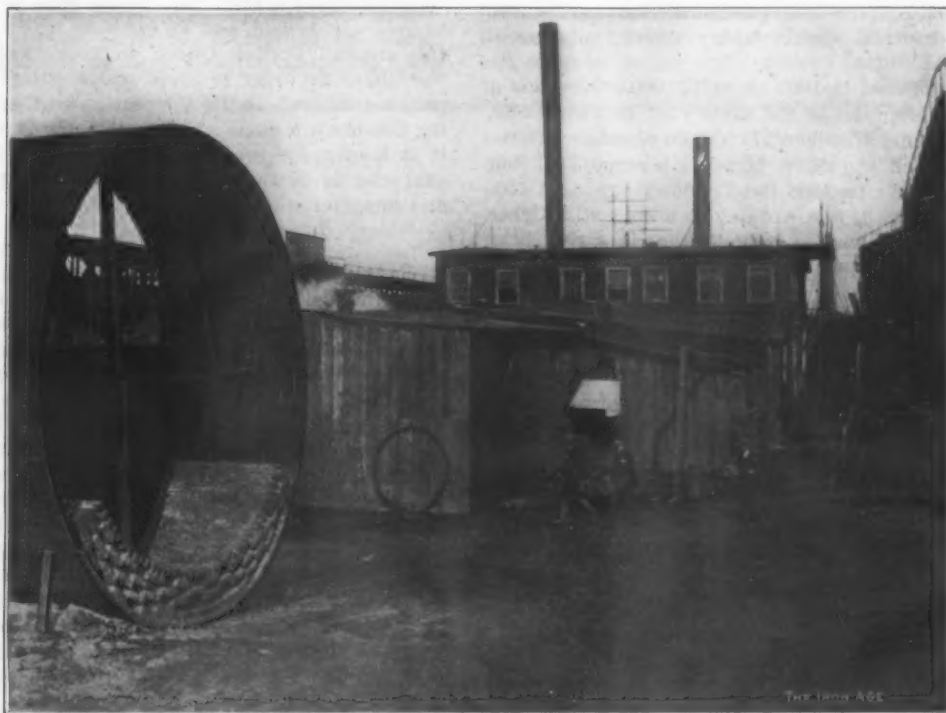


Fig. 6.—View of Buildings.—The Ring at the Left of the Cut is an Exact Reproduction of a Section of the Tunnel.

in sight, was of a peculiar dark slate color, which appeared to absorb the light as effectually as a dead black would have done. The writer has seen a man groping in his own shadow for something he had dropped, and with an electric light almost touching his back. Although the heading was small and had many incandescent bulbs, candles were freely used in order that the men might see work in hand.

An exposure of 40 minutes with 20 incandescent lamps hidden behind the nearest braces gave no image whatever.

ribbons were lighted by a candle, one after the other. The fogged appearance of the first engraving was caused by the dense smoke of the burning ribbon, which, in that closed chamber, dissipated very slowly.

The views are certainly not works of art, but under the conditions then prevailing were considered passable. The pictures then taken form the only photographic record of the early work.

(To be continued.)

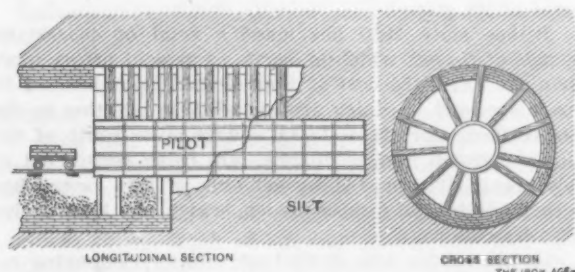


Fig. 7.—Sections through Heading, Showing Use of Pilot.

A calcium light outfit could not be made to work under the pressure—34 to 38 pounds to the square inch—and after the connecting tubes from the burner to the cylinders had burst two or three times, the men became frightened, and that plan had to be abandoned. Four-arc lamps were provided, each with a reflector behind it so that the light could be directed where needed. Fair results were obtained by this means.

The best pictures were made by burning magnesium

The Belgian Steel Syndicate.—The Sambre et Moselle Company, who were standing out, have come into the new Belgian Steel Syndicate, and it is now practically complete. The company were dissatisfied with an allotment of 10,000 tons per month out of a total of 96,000 tons, and demanded that the first 2000 tons of monthly orders in excess of 96,000 tons be given to them, any excess being distributed pro rata. The proposal did not meet with approval and the company finally accepted the original terms.

At the recent Cleveland convention of the Amalgamated Association resolutions were adopted which will considerably restrict President Shaffer's former methods of conducting the affairs of the organization. Another important change prevents the Advisory Board from granting any concessions to manufacturers unless agreed to by the members of the association. The new law bearing on this point reads: "After the scale has been signed by the manufacturers and the Amalgamated Association, under no consideration shall any board of officials or any official of the Amalgamated Association be allowed to grant the manufacturers any deviations from scale as signed for the scale year."

Southwestern Copper Developments.

BY DWIGHT E. WOODBRIDGE.

The rapidity with which the section embracing Arizona and adjacent territory is taking a prominent place as a copper producing country is not appreciated by the public. After observation of the leading camps of Arizona and Northern Sonora, I propose to give a somewhat hasty and condensed summary of what is going on there, and to sketch to the best of my ability what is to be expected from the leading mines of that region in the immediate future. The districts recently visited by me included not only parts of Arizona and Northern Mexico, but also Northern California, the boundary district of British Columbia, and Butte.

Arizona produced in 1902 about 120,000,000 pounds of copper, while Montana in the same year furnished 289,000,000 pounds and Michigan 171,000,000 pounds. Arizona that year showed a decline, largely on account of conditions at Jerome. In 1903 the Territory produced 150,000,000 pounds, and is now working on a scale still higher. It is not out of the way to estimate that in a very brief period Arizona will equal the production of Lake Superior and take second place in the United States.

The Territory Has Four Important Fields,

which are, in order of precedence, the Bisbee field in Cochise County, the Morenci-Clifton section in Graham County, the Jerome region of Yavapai County and the Globe district of Gila County. In the Bisbee region a most pronounced activity prevails, and the appearances are that this camp may, in time, rival Butte as a copper producer. This statement is made with a full realization of the fact that Butte has enriched the world by more than \$700,000,000, and is now adding annually from \$45,000,000 to \$60,000,000 to the mineral product of the United States. Two mines are now producing copper from Bisbee ores, one owned by the Copper Queen Consolidated Mining Company, chief of the Phelps, Dodge & Co. interests in the Southwest, and the other by the Calumet & Arizona Mining Company, a new enterprise in which Lake Superior iron and copper miners and Pittsburgh steel men are chiefly interested. These two companies, together with more recent organizations of the Calumet & Arizona party, control what seems to be nearly all the most valuable ground in the Bisbee quadrangle, though more than a dozen other mining and development companies are prosecuting explorations there with more or less chance of success. The Copper Queen Company have not far from 1000 acres in one block, of which a very large share is certainly underlaid with the copper bearing formation or with ore itself. Calumet & Arizona's copper bearing ground is limited to 100 acres or less, while its associate companies, the Calumet & Pittsburgh, Lake Superior & Pittsburgh, Pittsburgh & Duluth and Junction, have a total of about 1500 acres, much of which undoubtedly lies within what has come to be known as the "bonanza circle," though the value of both Pittsburgh & Duluth and Junction are yet to be proved.

The Bisbee Quadrangle.

The area of what is known as the Bisbee quadrangle is about 170 square miles, and includes the southeastern half of the Mule Mountains, one of the small isolated ranges characteristic of Arizona. Arizona, by the way, is not a mass of mountain chains, as is generally understood, but is a series of elevated plateaus, with short, unconnected mountain ranges covering a minor portion of its surface. Except for the mile-deep chasm of the Colorado cañon, the surface is generally prairie, though a desert on account of the universal lack of water. Indeed, if there was plenty of moisture in Arizona the Territory would grow any tropical or subtropical crop, though what effect an abundance of water, with the tremendous evaporation probable there, might have on climatic conditions is something that not even irrigation enthusiasts dare answer. The Mule Mountains have a general northwest-southeast trend and run from the old mining town of Tombstone to the Mexican line, a distance of some 30 miles. Bisbee's elevation is about 5200 feet, and the

highest point of the Mule hills is 7400 feet above the sea. The town has a population of some 7500, and is crowded into a few narrow confluent ravines in the heart of the range, all of them running into Tombstone cañon, and about seven miles from the Mexican boundary.

Bisbee has been a mining camp for 25 years. In the early days it was a silver lead camp, cerussite being a common mineral in the region. From 1880 the copper ore of the Copper Queen Mine was exploited profitably for a few years. In 1882 Phelps, Dodge & Co. of New York bought some claims and began explorations. Two years later the ores that had been worked since 1880 gave out and the camp was on the point of abandonment. A mine foreman drove a drift that looked good to him, contrary to orders, it is said, and an ore body was discovered from the original Copper Queen workings and the Atlanta workings. In order to avoid complications the two companies combined as the Copper Queen Consolidated Mining Company, a name which to this day is noted wherever it is known for everything that goes to make up high character in business, for honor, conservatism, liberality and financial stability.

The Reward of Persistence.

Four years ago the Calumet & Arizona Company entered the field. The stockholders were men who had made a conspicuous success of high class mining in a field in which the mining skill is recognized as without a superior. They were amply strong for any undertaking, both financially and from their staying qualities. It was well for the camp that these qualities predominated, for the Calumet & Arizona sank a large working shaft nearly 800 feet before signs of copper came in, and most men would have retired in discouragement. In the case of the Lowell & Arizona, an adjoining property, the owners did withdraw when within 30 feet of ore, and thereby lost untold millions of values, for the Lowell is now one of the richest portions of the Bisbee group. Had this been done in the case of Calumet & Arizona the great wealth of the deeper levels of the Bisbee hills might have remained unknown for many years, and the Copper Queen itself would have been of far less importance than it is to-day. It has been the advent of the Lake Superior people that has brought Bisbee to the front. These people have introduced new methods into the Southwest, have gone deeper and found ore where older miners did not believe it existed, have poured into that camp within three years more than \$4,000,000 for the purchase of lands and the development of mines, and have made contracts that will require the outlay of half as much more in the coming 24 months. The Calumet & Arizona has already become a wonder to the copper mining fraternity. It is now making 80,000 pounds of copper daily in two 300-ton furnaces, and is hoisting all its rock out of one shaft, making this shaft the most productive copper operation known. In three years this mine has developed ground that will maintain the present rate of production for more than ten years, and has not found the bottom of the first 12 acres of its ground.

Bisbee since 1880 has made a total of 465,000,000 pounds of copper, which is worth, at present prices, more than six times the cost of that Gadsden purchase of 50 years ago, and in which are included, in addition to the Bisbee field, more than 45,000 square miles south of the Gila. A dozen mining districts are being prospected in this area. Of course the great bulk of this copper has been made by the Copper Queen, which has been active for 24 years.

Besides these two important mining companies referred to above there are a number of prospecting concerns, located either close to Bisbee or along the general strike of the region to the Mexican line. Every inch of ground between Bisbee and the Mexican line, beyond the latter well into the southern republic, and for miles in width, has been staked as mining claims and is held at figures that seem absurdly high, when one recollects that the actual copper bearing area, so far as now determined, is comparatively narrow and quite short. Sixteen companies, variously styled "mining" or "development," according to the optimism of their promoters, have been engaged in explorations in the Bisbee field, though some of

them, like Copper Glance and Marquette & Arizona, are eight or nine miles from the productive camp. These companies are in varied positions, both financially and geologically, and their chances of ultimate success are more or less dubious. So far as mining at Bisbee is concerned they are not a present factor. At the head of every peak and in every gorge prospectors are burrowing, often in locations apparently valueless.

The Important Interests of Phelps, Dodge & Co.

Phelps, Dodge & Co., who own practically all the stock of the Copper Queen Consolidated Mining Company, are also heavily interested in other parts of Arizona. They are the largest factors in the Territory, and rank as copper merchants among the great concerns of the world. The Globe district lies on the Gila River, about 125 miles

At Jerome, 150 miles northwesterly from Globe, and near the line of the Santa Fé road, is the mine of the United Verde, a property that has been more lied about, and boomed by people who knew nothing about it, than any other going metallurgical concern in the United States. It is making at the rate of about 35,000,000 pounds of copper a year. Its largest production was in 1899, when it reached 43,996,000 pounds. Including its gold and silver values the mine is said to produce copper at less than 4.5 cents per pound.

Arizona has numberless copper share selling companies and several new regions of prospective importance. Among these latter are new fields near Florence, in the Chiricahua, Dragoon and Bradshaw Mountains, near Wickenburg, and elsewhere. Some of these will doubtless come in as important factors in production; others



MAP OF THE WARREN MINING DISTRICT, ARIZONA.

northwest from Bisbee, and has been operated more or less since that terrible scourge of the Southwest, the Apache, became temporarily less violent, in 1874. Until 1884 silver mining was predominant, and at that time 86 stamps were at work near Globe and the Silver King mine was at the depth of 715 feet. Since 1881 the Old Dominion and United Globe mines have produced 142,000,000 pounds of copper and are now running on a large scale. Both are now in the hands of Phelps, Dodge & Co., and send a portion of their ores to the Copper Queen's splendid new smelting plant at Douglas, near Bisbee.

In the Clifton district, 90 miles east of Globe, are the mines of the Detroit, Shannon and Arizona copper companies, the first of which is the property of Phelps, Dodge & Co., the second of Boston interests, while the third is an English concern. The first copper made in the Territory was produced at Clifton, from the Longfellow Mine, in 1873. At that time the nearest railway point was 800 miles away, through a region terrible for lack of water and for heat, and swept by bloodthirsty Indians.

may not bear examination. The copper deposits of the Territory are, as a rule, found near the contacts of igneous rocks with carboniferous limestones, and are, generally speaking, an altered lime. Sometimes the copper bearing solutions have altered porphyritic rocks. Most of the commercial ores of copper are found in profusion, together with native copper, though enargite is rare. In Bisbee the oxidized zone extends to a depth of, in places, 500 feet, and is notable for the richness and extent of its carbonate ores. Its ores are, with the proper metallurgical formulæ, nearly self fluxing. The ores of Globe are largely oxidized, but highly siliceous, and because of the lack of sulphides are being shipped to Douglas for reduction. The ores of Jerome are almost entirely unaltered disseminated sulphides, not extremely high in copper, but rich in gold and silver values. The United Verde itself is a great lense of sulphide in a slate country, intruded by igneous rocks and capped by unconformable limestones without values. At Clifton the rich oxidized ores formerly found gave out at shallow depths and were

succeeded by barren rock. Vast beds of low grade sulphides now form the chief ore of the district, though carbonates and native copper are still mined. A portion of the ores from Clifton will be smelted at Douglas, and some tonnage is sent to El Paso, Texas, for reduction. In the Chiricahua district, a new field about 50 miles east of Bisbee, they are now finding cerussite and galena, as well as sulphides of copper, while near Florence bodies of sulphides are said to be cut beneath the carbonates and oxides found on surface.

Labor Conditions Are Satisfactory.

Labor conditions in Arizona are unusually satisfactory. At some of the camps, notably Bisbee, there are no unions, and attempts of union organizers to break into the camp have met with failure. The sight of a thousand or two high paid miners who contribute nothing to walking delegates and union treasuries is an unpleasant one for the latter, and efforts to secure a foothold will probably be made from time to time. In most districts Mexicans, Chinamen and Italians are numerous. This is especially the case at Clifton and vicinity, where nearly 3000 Mexicans are at work in mines and smelters. At Bisbee no foreigner need apply, and the *morale* of miners there is noticeably high. No Chinaman is permitted to remain in the town more than 24 hours. This and Morenci appear as model mining camps, both from the standpoint of high grade of men employed and the provision made by Phelps, Dodge & Co. for their welfare. A recent strike at Clifton seems to have left no permanent scar, and present conditions there are excellent.

Except in out of the way sections, or where conditions prevent it, the Butte scale of wages prevails in these Arizona camps—eight-hour shifts and a day's wage of \$3.50 for miners. Contract mining is rare. A few days ago the Copper Queen voluntarily reduced hours of work at their Douglas smelter to eight. Care is exercised that miners secure the necessities of life at reasonable prices, and sanitary conditions are better than might be expected.

The Youth of Southwestern Copper Mining.

The most striking thing about those new Southwestern copper camps is their youth. Cananea is less than five years old, but it is a fully developed producer on a grand scale and represents an almost incredible amount of work. Calumet and Arizona at Bisbee is little more than three years old; the first spade was driven into the ground on the site of its Irish Mag shaft scarcely more than four years ago, but it is one of the great mines of the world, so far as production and earnings are concerned. Its associated companies are from one to two years of age, but one is a mine and another seems to be as sure as anything but death and taxes can be. In the course of a few months it will be possible for a man to walk underground from a point beneath the center of the village of Bisbee south to No. 3 shaft of Lake Superior and Pittsburgh, a distance of more than two miles by direct line, though much more by the course followed; or if he wishes to turn at right angles to that course he can travel from Congdon shaft of the Pittsburgh and Duluth to Junction shaft, in a straight line about a mile. These openings are partially through Copper Queen ground and in part through those of the Calumet and Arizona group, for the companies have pursued a most commendable course of mutual interdependence and association of exploration. All the ground thus opened is in the limestone formation in which the ores of Bisbee are to be found. With the exception of the original workings of the Copper Queen, which cover about 3000 feet in the north end of this area, every foot of these horizontal openings, as well as nine shafts in the same ground, has been driven or sunk since three years ago.

It was in November, 1902, that the first furnace of the Calumet and Arizona was blown in. It was built for a smelting capacity of 250 tons of material daily. The second furnace blew in five months later. Since then both have been operated steadily. In the 18 months that have intervened since the mine commenced production, it has paid off a debt of some \$350,000 incurred in construction, paid in dividends \$700,000, with \$300,000 more payable June 19, and has accumulated a surplus of about \$1,800,000. The mine is now earning net at the rate of

better than \$2,000,000 a year. As a comparison with this new copper mine in the far Southwest, it may be mentioned that the entire dividends of the Cripple Creek gold region in Colorado, with all its large and important producers, were for 1903 \$1,800,000. The entire Coeur d'Alene region in Washington, with its silver-lead mines forming the basis of several important smelting combinations, earned net last year just about the same as the Calumet and Arizona.

The Calumet and Arizona Mine.

Underground development at this mine is now confined almost entirely to its Irish Mag claim. Here is a three-compartment vertical shaft, 1300 feet deep, situated 900 feet south southwest from Spray shaft of the Copper Queen and about 4000 feet in the same direction from the town. The workings are all in carboniferous limestone. Stopping in this mine began in the fall of 1902, and before the close of that year it was hoisting 300 tons daily, which was increased early the following year to 600 tons, and this is about the present rate, though on account of the fact that numerous openings that had been in barren rock worked into ore, the hoisting record for some time has been more than 1000 tons daily. This is more ore than the smelter can treat, however. A second shaft, named the Oliver, after the late Henry W. Oliver, who was the largest holder of the company's shares, is now going down 1600 feet southeast from the Mag. It is at the depth of 800 feet, and has cut considerable ore, most of which has been rich black sulphide, assaying much better than 10 per cent. This working lies some 700 feet west of Lowell shaft of the Copper Queen, and drifts connecting the three may be holed through shortly. Development of ore bodies showing in the Oliver workings will be undertaken this year, and the discovery of sulphides there has been especially pleasing to the company, as they have had a surplus of carbonates and oxides and rather a dearth of sulphides in the Mag. These Mag developments cover about 12 acres of the claim of that name, and copper was encountered from the 800-foot level to the bottom of the shaft. A diamond drill working in the bottom of the mine has been cutting mineralized ground for several hundred feet more. The mine is developed with ore blocked out for several years' production, there being perhaps six or eight years' reserves in sight, with new workings in ore frequently. Mining is confined to the 950 and 1050-foot levels, and the richer ores are, generally speaking, left in the mine. Ore bodies seem to run the full width of the claim.

Ores shipped last year to the company's smelter averaged a recovery of 8.88 per cent. copper, with 0.59 per cent. lost in slag, showing the average of all ore hoisted to have been 9.47 per cent. The mine has been opened on the square set system, with waste gobbed back for filling mined out rooms. The production of ore has been at the rate of $1\frac{1}{2}$ tons per day per man employed, both on surface and underground.

The general character of the mineralization of the Calumet and Arizona is similar to that of the remainder of the district; the ore occurs in carboniferous limestone, on the southwest side a great fault and closely associated with a mass of intrusive granite porphyry. The United States Geological Survey makes the following illustration of the structural relations: "If the half of a broken saucer be placed on a table with the fractured edge lying about west northwest, and if the back of a book be laid against this edge we shall have a rough illustration of the geological structure. The saucer represents the synclinal attitude of the paleozoic beds, from the upper limestone down to and including a cambrian quartzite. The broken edge is the great fault, while the book is pre-cambrian schist, against which limestone has been dropped by this fault, with a throw of more than 1500 feet."

Ore occurs as large masses within the limestone, somewhat crossing its stratification, and the horizontal extent of the ore lenses is usually much greater than their vertical. Near the northern limit of the saucer ores occurred at surface, and have been worked down as oxides for 400 feet. The ores are irregular replacements of limestone. Originally pyritic, they owe their value to secondary concentrations effected by processes of sul-

phide enrichment and oxidation. Strangely enough the oxidation of ore bodies has proceeded downward in Calumet and Arizona more than 1000 feet, while chalcocite has been found at a considerably higher level.

Associated Properties.

To the east of Calumet and Arizona, and separated from it by Copper Queen's Lowell mine, lies Calumet and Pittsburgh, in which most active work is now under way. A shaft was sunk here two years ago, and at 915 feet so much water was struck that it was impossible to go much deeper. Pumps of a capacity for 3000 gallons a minute against a static head of 1500 feet are now being installed in one of the largest shafts in the west, 5 x 30 feet inside timbers. The work of enlarging this from a two-compartment shaft was begun in February and was completed in early May. The shaft is 964 feet deep. On the 910-foot level, just above water, drifting has been carried forward in several directions for a total length of 3500 feet. Much of this ground shows ore, and still more shows that leached or oxidized material which in this camp is a good indication of ore bodies nearby.

Calumet and Pittsburgh ground lies close to the intrusive porphyry that seems to have had much to do with the concentration of ores in the camp, and its surface is seamed with ferruginous dykes, which, though barren of copper, have been shown by experience to be frequently associated with an underlying ore body. Though without, as yet, the actual presence of ore in minable quantities, no property in the district has better showing for the work done.

Directly south and south southeast of Calumet and Arizona, and joining both Lowell and Calumet and Pittsburgh, lie the 640 acres of Lake Superior and Pittsburgh, for which the owners last month paid \$1,050,000, the balance of the purchase price. The Cole shaft, 4000 feet south of Oliver and Lowell, has cut on the 1000-foot level a body of rich oxide ore averaging not far from 20 per cent. copper, and carrying considerable gold. This was run out of in 130 feet, and several cross cuts, as well as an upraise and a winze, have shown it to be of considerable dimensions. Drifting is now in progress on the 1100-foot level to cut this ore, if it makes there also. From No. 3 shaft, 3000 feet still further south, considerable ore that appears to be related to that in the Cole has been cut. Cole shaft is 1140 feet and No. 3 is 900 feet deep. Something less than 5000 feet of drifts have been driven in this mine, and the two shafts will be connected as soon as possible. This company are now being converted from a development to a mining concern, and the payment of the \$1,050,000 was made six weeks in advance of its date by a few leading stockholders who wanted to clean up the records.

Pittsburgh and Duluth, which lies adjoining and west of Calumet and Lake Superior properties, has a shaft 2000 feet west of the Oliver and down 1000 feet. Drifts from Mag and Cole shafts are working toward it. Both surface and underground indications at this property are excellent, but as yet no ore has been found.

Junction, the latest of this group, lies adjoining and directly east from Calumet and Pittsburgh, and its shaft is 3000 feet east from Lowell. This shaft is down about 600 feet and will shortly be connected with the Calumet and Pittsburgh. The location is considered favorable and some copper has been found.

Calumet and Arizona has a smelter at Douglas, a town 25 miles from Bisbee, located for smelter purposes by the Copper Queen and Calumet & Arizona companies. This smelter consists of three rectangular standard type water jacket furnaces, 44 x 180 inches in size, hand fed. There are two copper Bessemerizing converter stands, with 7 x 10 feet converters of the trough or Bisbee type. The whole is contained in a steel building. This plant cost less than \$600,000, and with two furnaces in operation has averaged for 30 days more than 100,000 pounds of blister copper, 99 per cent. fine, per day. It was built during 1902, at a time when all material was difficult to secure, in 11 months from the time plans were begun, a record of which both the mining company and the Allis-Chalmers Company, its builders, are very proud. Two furnaces are maintained in operation, with one in

reserve. It has been decided to add a fourth stack and to put in power sufficient to drive all four, anticipating a large increase in the capacity of the mine. It is not probable that all this additional capacity will be used by the Calumet and Arizona for some time, but a part will be available for either of the associated companies that may first have ore for reduction.

This really phenomenal group of mines is certain to make a much larger production as its development proceeds, and it will be many years before its ground is thoroughly prospected. The probability is that, once developed, the associated companies that find mines will be consolidated with Calumet and Arizona, and that the combination will be one of the very foremost copper producers of the world.

Lake Ore for the Dominion Iron & Steel Company.

DULUTH, MINN., May 20, 1904.—A most interesting shipment of iron ore was made to-day. It was a cargo of Mesaba, Albany grade, guaranteed 60 iron and 0.077 phosphorus, from Pickands, Mather & Co., to the Dominion Iron & Steel Company at Sydney, Cape Breton. The cargo consisted of 1704 gross tons and is the first to go in that direction. Others are to follow, it is understood. The "Turret Cape," an English built ship, carried this cargo. She is built for the Welland and Canadian canal traffic, and took the load with a draft of 13.5 feet, which will permit her to pass the Welland without lightering. The St. Lawrence canals are all deeper than the Welland. The shipment of this cargo from Mesaba to Sydney is interesting in the fact of distance and in the light it throws on Cape Breton ores, particularly in view of Canadian bonus requirements.

A considerable amount of Mesaba and western Lake Superior ore has been sold this year for tidewater. Some of these sales have been referred to before. It is now said that sales for all-rail shipment to the South have been closed and that more are pending. The price of Mesaba ores is a help in its widening distribution.

Troy mine, Mesaba range, operated by Pickands, Mather & Co., will be closed down indefinitely next week. It is located at Eveleth. That the closure is for some time is indicated by the withdrawal of pumps.

The mines of Joseph Sellwood and associates in the Gogebic range, Sunday Lake and Brotherton, have been suddenly closed down tight and indefinitely. These two mines were closed without the slightest warning, so suddenly, in fact, that nearly 200 men of the night shift were in the act of changing preparatory to going to work when the orders kept them all above ground. There is not now anything working in the Wakefield section of the Gogebic but the small Castile, formerly Comet, which is under exploration with a force of less than 100 men, by Corrigan, McKinney & Co.

D. E. W.

The Monell Process at South Sharon.—The Carnegie Steel Company have recently introduced the Monell process for making open hearth steel at the South Sharon Works, South Sharon, Pa. We are advised that the process has worked very satisfactorily at this plant.

The Mexican Light & Power Company, Limited, of Montreal, Canada, recently placed in this country an order for copper cable for transmission, which is probably the largest single order for transmission cable ever placed. The order calls for 1500 miles of cable, equal in carrying capacity to 3/0 B. & S. gauge, and weighing approximately 4,200,000 pounds. The cable is to be used on the Nicaxla-Mexico power transmission line, now under construction, and it will be supported on steel towers in spans of 500 feet. The length of the spans, together with the necessity of reducing the dip as much as possible and the high wind pressure to be withstood, made the matter of cables one of considerable importance. The cable was designed by W. G. Clark of Seattle, Wash., electrical engineer.

The Stoever 8-Inch Pipe Threading Machine.

The service to which pipe threading machines are subjected is a severe one, particularly as they are usually operated by unskilled laborers. The machine shown in the accompanying illustrations is one recently brought out by the Stoever Foundry & Mfg. Company, Myerstown, Pa., and has received special attention in the proportioning of its various working parts such as to give the required

three-jaw independent type. The faces on the slides are graduated, making it easy to set them to any particular size of pipe. Special grips for holding flanges for flange fittings are placed on the slides of the rear chuck. By using these grips the fittings can be made up on the pipe much more quickly than by hand and with a much tighter joint. The advantage of being able to grip the pipe in two places will be appreciated by users of these machines. Each chuck is complete in itself—that is, no face plate is

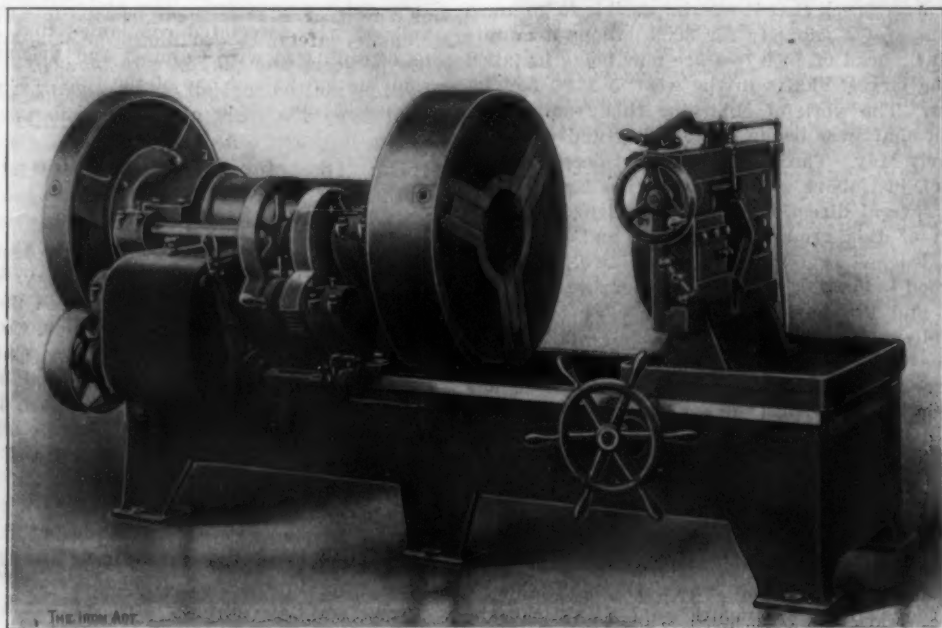


Fig. 1.—Front View Looking Toward the Rear Chuck

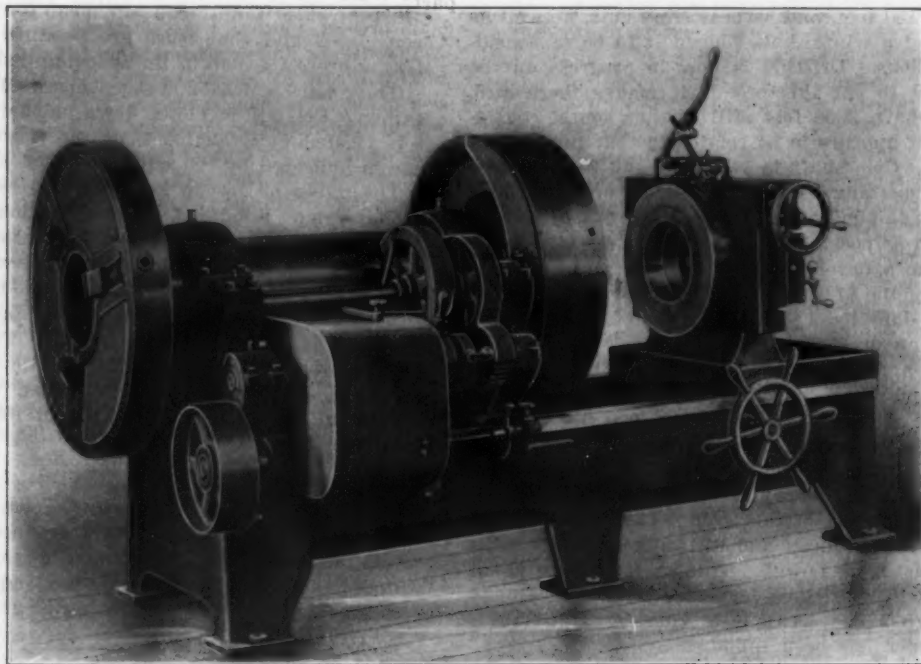


Fig. 2.—Front View Looking Toward the Front Chuck.

THE STOEVER 8-INCH PIPE THREADING MACHINE.

strength and protect it against abuse. Simplicity in construction and operation were also features aimed at. Fig. 1 and Fig. 2 are both views of the complete machine seen from the working side.

The head stock of the machine is made of a single casting, thus insuring rigidity as well as permanent alignment of all the bearings. The bed is heavy and stiff and well braced across the part over which the carriage travels. Both front and rear chucks are provided with jaws for gripping the pipe. These chucks are of the

necessary to form the back of the chuck. The shells are single castings, and consequently very rigid.

The machine is capable of cutting pipe from 2½ to 8 inches in diameter, a separate set of dies being furnished for each standard size, of which there are nine. It is naturally desirable that there should be at least one speed for each size of pipe, and the machine, therefore, has been designed with ten speeds. These speeds are graduated to give the proper cutting speed for each individual size to secure the greatest economy. In this re-

spect this machine has a distinct advantage over older ones, as those now on the market can provide but six speeds for the nine sizes of pipe. Fig. 3 shows the speed changing mechanism with the gear case removed. The ten speeds are obtained through a gear box giving five separate speeds by means of a sliding gear. This range

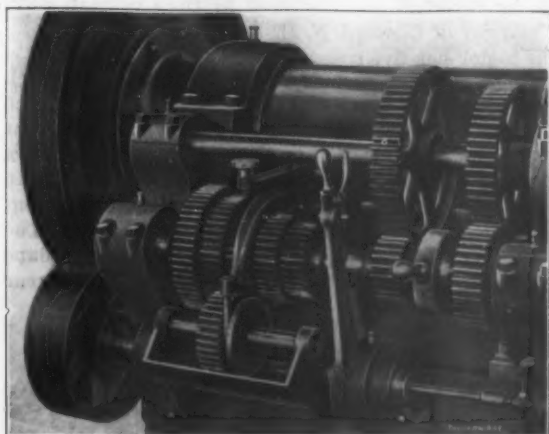


Fig. 3.—A nearer View of the Speed Changing Mechanism, Showing the Gears with Cover Removed.

is doubled by throwing a double clutch on the cone gear shaft, connecting it to either one of two trains of gears of different ratios. This clutch is an improvement over one using a sliding gear, as it may be thrown over at any point. The advantages of driving with a single pulley are apparent. A constant belt speed is obtained, which may be designed for the maximum work, and the machine can be placed either in line with or at right angles to the countershaft. Also a constant speed motor can be

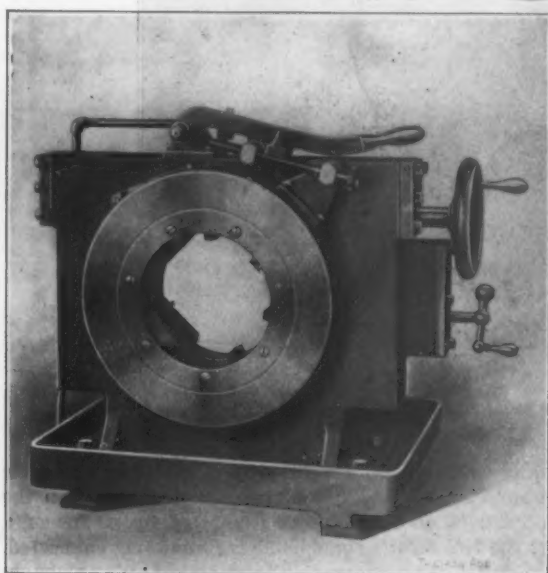


Fig. 4.—The Die Carriage.

attached in the simplest manner. The manipulating of the gear box is simple and is accomplished by the two levers above the cone of gears. The mechanism consists of a cone of five gears on an intermediate shaft, and a sliding pinion meshing with a long pinion on the driving shaft, the face of which is equal in width to the combined faces of the five gears on the cone. The sliding pinion runs loosely on a spindle carried in a cradle which rocks on the two brackets forming the bearings of the driving shaft, and may be brought into mesh with any one of the gears on the cone. The cradle is keyed on the body of the vertical lever which is supported on the two brackets mentioned. The two levers previously referred to have a common pivot which is supported on the head stock of the machine. The sliding pinion has a flange on one side, as shown, which forms a recess for the shifting

pin. The case is oil tight, and a small quantity of oil placed in the bottom of it will keep the gears lubricated for a long time. An oil cup is so placed as to prevent too much oil being placed in the box and running out through the bearings. These bearings are designed to throw back the drippings which may collect on them. On the outside of the box is placed a speed index plate giving the proper speeds for the various sizes of pipe and showing how to obtain them.

The use of an internal driving gear instead of an outside spur gear adds to the appearance of the machine, as well as its safety. It also allows the same ratio of gearing with the gears brought closer to the body of the machine. It will be noticed that all of the gearing can be easily removed from the machine without disturbing the other

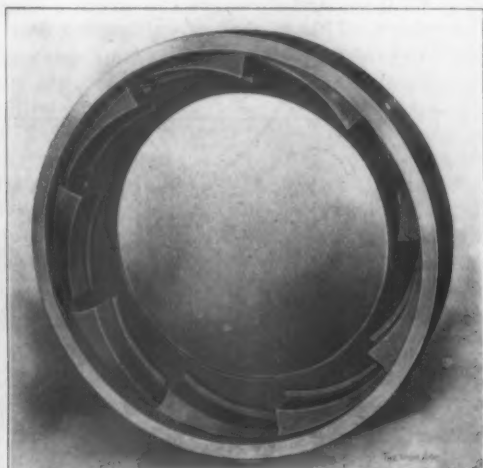


Fig. 5.—Detail of the Cam Ring.

parts, which is an important feature when possible accidents are considered.

The die carriage removed from the machine is shown in Fig. 4. In the die some marked improvements have been made. The cam rings in the present machines are of cast iron, with the cams cast in the body of the rings. This design is good as long as the cams retain their original form. However, chips from the pipe are certain to work down into the ring and eventually wear the surfaces of the lower cams. This causes the lower dies to drop out of line with the upper ones, bringing all of the cutting strain on the latter. It is often impossible to repair the cam ring, and an entire new one is costly. In this machine the cams are made of steel forgings hardened and inserted in the ring, as shown in Fig. 5. They are interchangeable in the same ring, and should occasion require can be replaced at a small cost. With this improvement the dies are prevented from losing their gauge. Fig. 6 shows one of the cam segments, the bevel key for holding it in the ring and one of the removable dies. As

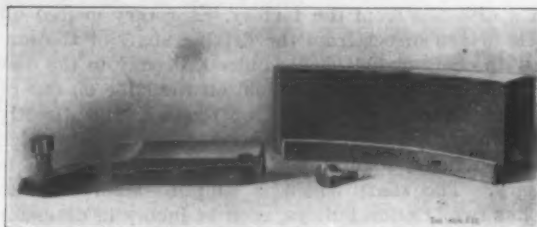


Fig. 6.—Detail Parts of the die.

a precaution against getting out of lead, which always means a stripped or double thread, the bottom of the slots in which the chasers travel are formed by hardened steel plates. As the face ring on the front of the chaser holds it against this hardened plate there is but little chance of its getting out of lead. The chasers may be removed through the center of the head when the head is expanded its full amount, and to prevent the upper chasers from falling out spring pins are placed in the ends of the upper cams. These pins engage in the slots

in the ends of the chasers, but the latter may be released by a slight pull.

The adjusting mechanism is an improvement on the old lever type. The improvement consists in placing the hand nut of the adjusting screw on the side of the machine directly in front of the operator and reversing the leverage to bring the lever to rest on the screw, thus maintaining a straight line adjustment and preventing the digging into the thread before releasing, a common fault with the old mechanism. The adjusting screw shown in the figure was made with a long thread for experimental purposes, but in actual practice only about half of the rod is threaded and the lever bears on the smooth part.

The chasers used are made of single pieces of steel without pins or links to get lost or to be replaced. There are seven to each set, and these are cut one at a time in a special machine. This method of cutting not only reduces the cost of manufacture, but allows a single chaser

The Stockbridge Electrically Driven Shaper.

In connection with their new style 24-inch shaper the Stockbridge Machine Company of Worcester, Mass., have just perfected a form of electric drive whereby 20 changes of speed are obtained. The apparatus consists of 3 horsepower variable speed motor and mechanical speed changing device, or variator, manufactured by the Cushman Electric Company of Concord, N. H.

The motor has five speeds and upon the motor shaft is a cone of four gears, which give four speeds with each speed of the motor. Each of the four gears on the cone is operated by one of the four gears shown on the front of the motor case. Each of the gears is mounted on a shaft which has on its inner end a pinion corresponding in size to its step of the gear cone. The shafts are of different lengths, to correspond with the steps of the cone. The four gears at the front of the motor case are in the plane of a pinion on the motor shaft. Each of the four gear

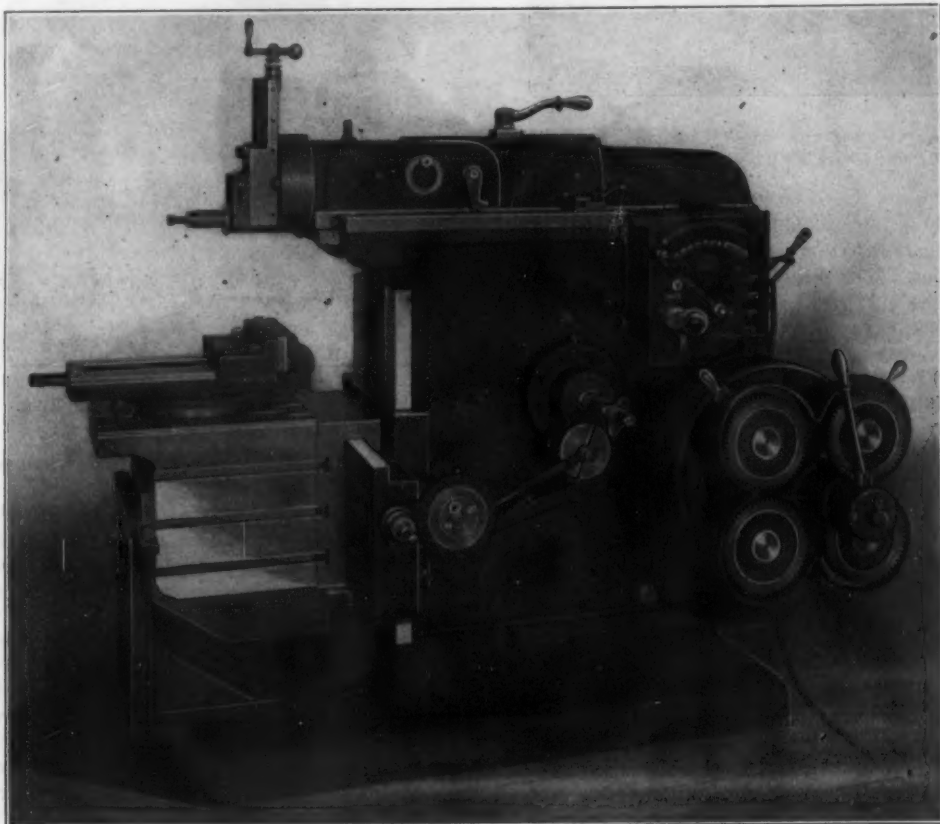


Fig. 1.—General View of the Machine, Showing the Devices for Manipulating the Speed Changing Mechanism.

in the set to be replaced without affecting the balance of the set, which is a great advantage to those whose shops are at a distance from the factory. A rotary geared oil pump is driven direct from the driving shaft of the machine with chain or belt. Oil is piped directly to the dies and cutting off tool, which is held on the slide on one of the steady slides. In the bed of the machine directly under the carriage there is a reservoir for the oil, which is so constructed that only a small quantity of oil is necessary. The shaft which is supplied with the machine has two friction pulleys, each 14 inches in diameter and of a width to accommodate a 4-inch belt. One of these pulleys can be used for the reverse or for an additional speed. The shaft should run at 175 revolutions per minute. The machine, with countershaft and dies, weighs 6000 pounds. Three sizes are made: the No. 4 machine, having a capacity of from 1 to 4 inches; the No. 8, from 2½ to 8 inches, and the No. 12, from 4 to 12 inches.

Plans have about been completed by which the Youngstown Steel Casting Company and the Youngstown Foundry & Machine Company of Youngstown, Ohio, will be consolidated.

shafts is mounted on an eccentric, and each eccentric has a sprocket wheel. For convenience in operation the two eccentrics on the left are connected by means of a chain; the two on the right hand are similarly connected. This sprocket chain connection is employed only in changing the speed of the motor by throwing the gearing in and out. The two levers seen at the top of the motor case operate the eccentrics. Each controls two speeds. One position of the lever places one of the two gears on its side in mesh with the pinion on the main shaft, and at the same time the pinion on this gear shaft in mesh with its step of the cone of gears. Another position of the lever puts the other gear and its pinion in mesh, at the same time throwing out the first gear by the action of the eccentric operated by the sprocket wheels and chain. The third position places both gears in neutral position, both out of mesh, which is necessary while one of the speeds procured by the gearing on the other side of the motor is in use.

By means of this system of gearing 20 speeds are obtained, varying from 50 to 350 revolutions of the main shaft per minute, which give from 5 to 70 strokes of the shaper.

The shaper is fitted with a friction ring clutch be-

tween the driving mechanism and the motor shaft. The gear is supported by an outboard support, being mounted on the main driving shaft. A short distance into this shaft a hole is drilled, in which the plunger is operated by means of the lever handle shown in Fig. 1. The plunger, which terminates in a cone shape, in turn operates the fingers, which in their turn expand the friction ring, as shown in Fig. 2. These fingers are held by a spring and adjusted by a screw, as will also be seen in Fig. 2.

The arrangement is very sensitive and powerful. The shaper can be stopped or started in any position without stopping or starting the motor, and is entirely operated

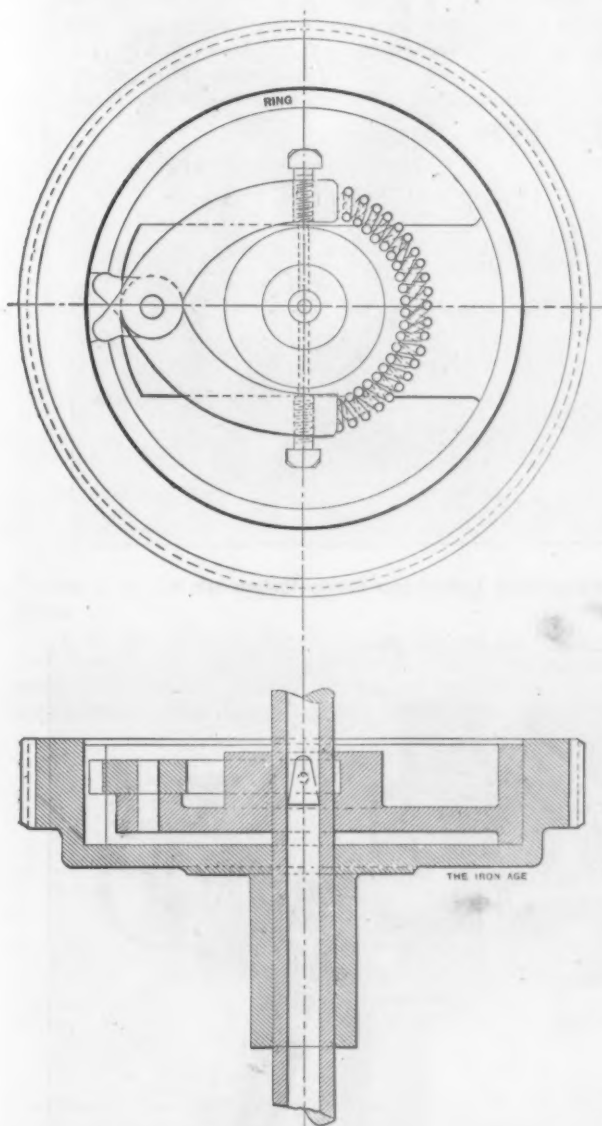


Fig. 2.—Details of Construction of the Clutch Used in Starting and Stopping the Machine.

by the one lever handle shown in Fig. 1. The apparatus is all placed in such a position as to be within easy reach of the operator while at his work.

An English contemporary, commenting on American battle ship designs, relieves himself as follows: "American naval architects are compelled to design to 'whip creation.' Any Congressman from some inland State is able to criticise and help to throw out any design that does not appeal to him as whipping creation, and we shall have to wait for a big war to find out whether the peculiar conditions under which the amateur sets the pace in American designs are good or bad for naval architecture. Till then American ships must be things apart, so far as paper comparisons are concerned; compare them by whatever system we may select, they will always come out at the head of the list."

St. Louis World's Fair Notes.

The first of the contestants for the World's Fair aerial navigation prizes arrived with his air ship May 23. Arrangements are now under way for putting it in commission, when demonstrations of its possibilities will be made by the inventor, Mr. McGary of Memphis, Mo., who claims that it will outfly and outpoint all others. The balloon is a varnished egg shaped cotton bag, 48 feet long and 21 feet in diameter, and will hold 10,000 cubic feet of hydrogen gas. It is capable of lifting with ease the 90-pound car and two passengers. Propelling is accomplished by four huge wings attached to the side of the car beneath the gas bag. The wings are shaped like those of a fly, and in mechanical structure are made as nearly as possible like those of the insect. The inventor copies the fly in the belief that its wings, unlike those of a bird, exert a pulling effort with both the up and down strokes and therefore give double the propelling power. The car is 21 feet long, 5 feet wide and 4 feet deep. The rudder is shaped like a fish's tail and is attached to the stern. Mr. McGary has been experimenting with air ships for 12 years and now believes he has overcome the last difficulty, the problem of propelling. The problem of lifting was long ago solved. Power for the wings may be furnished by the two occupants of the ship working as oarsmen, or by electric or other power.

The aeronautical contests will begin June 6. The concourse on which they will take place covers 12 acres and is nearly complete. It is surrounded by a fence 30 feet high and 3000 feet long, and serves as a harbor for the air ships, the fence being used as an air break to protect the craft from the wind when launching and landing. In the center of the inclosure is the aerodrome or stable for the machines. It contains two huge stalls, each 180 feet long, 40 feet wide and 50 feet high. The entrance to each stall is closed by two large doors, 20 feet wide and 50 feet high. Five balloons will be raised on the concourse. Three of these during the contests will be used as stake buoys, and the remaining two will carry visitors a thousand feet skyward to give them a bird's-eye view of the fair and surrounding country. The contests, for which there have been 60 entries, will take place between June and September.

Hydrogen gas for the balloon will be supplied by a gas plant installed by the Exposition Company and having a capacity of 5000 cubic feet per hour. The plant is part of the British exhibit and was built by the Industrial Engineering Company, Hyde, Manchester, England. Hydrogen gas is vastly better than common illuminating gas as it gives a lifting power of 70 pounds per 1000 cubic feet, whereas illuminating gas gives but 15 to 30 pounds. A much smaller balloon will therefore suffice if hydrogen gas is used, and as there is a further reduction of weight from the use of a lighter balloon the advantage is double. Heretofore the objection to the use of hydrogen gas has been its excessive cost, averaging \$10 per 1000 cubic feet, and as a balloon of moderate dimension would require 25,000 cubic feet the cost has been a serious obstacle. The hydrogen gas plant secured by the Exposition Company is constructed on a new principle, whereby pure hydrogen gas can be produced for 50 cents per 1000 cubic feet, the only materials being common soft coal and water. The plant is situated on the aeronautic course west of the Administration Building and presents features of scientific interest. Visitors to it will be shown the process by which a fuel gas of high calorific power may be produced from cheap coal, and the subsequent transformation of the crude fuel gas into hydrogen will be described by those in charge.

The most beautiful automobile ever exhibited is the feature of the French section in the Palace of Transportation. It is exhibited by Dietrich & Cie and is valued at \$18,000. The interior furnishing, which alone cost \$3000, includes four revolving armchairs, a combination table and an electric light chandelier. A series of electric buttons is used for giving signals to the chauffeur from the inside. The motor is rated at 30 horse-power, but is actually capable of 40 horse-power.

In the Palace of Liberal Arts the installation has

just been completed a model of the reaction breakwater constructed at Aransas Pass, on the Gulf of Mexico, under the direction of Lewis M. Haupt of Philadelphia. It illustrates how this breakwater keeps the channel scoured out without dredging. Other models show the scheme for opening the southwestern pass of the Mississ-

The Shuster Wire Forming Machine for Large Shapes.

An entirely automatic machine for the purpose of forming wire into large shapes and performing such work as is required in the making of broiler wires, oven racks,

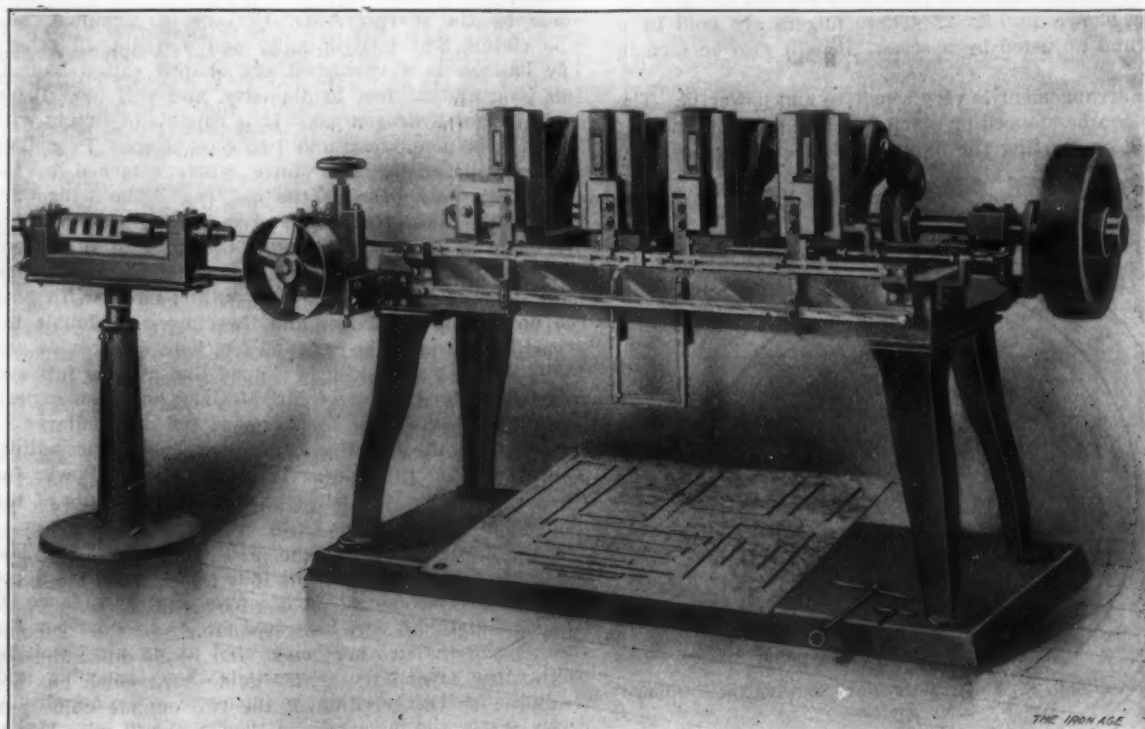


Fig. 1.—General View of the Machine, with Samples of the Work It Performs Shown Underneath It.

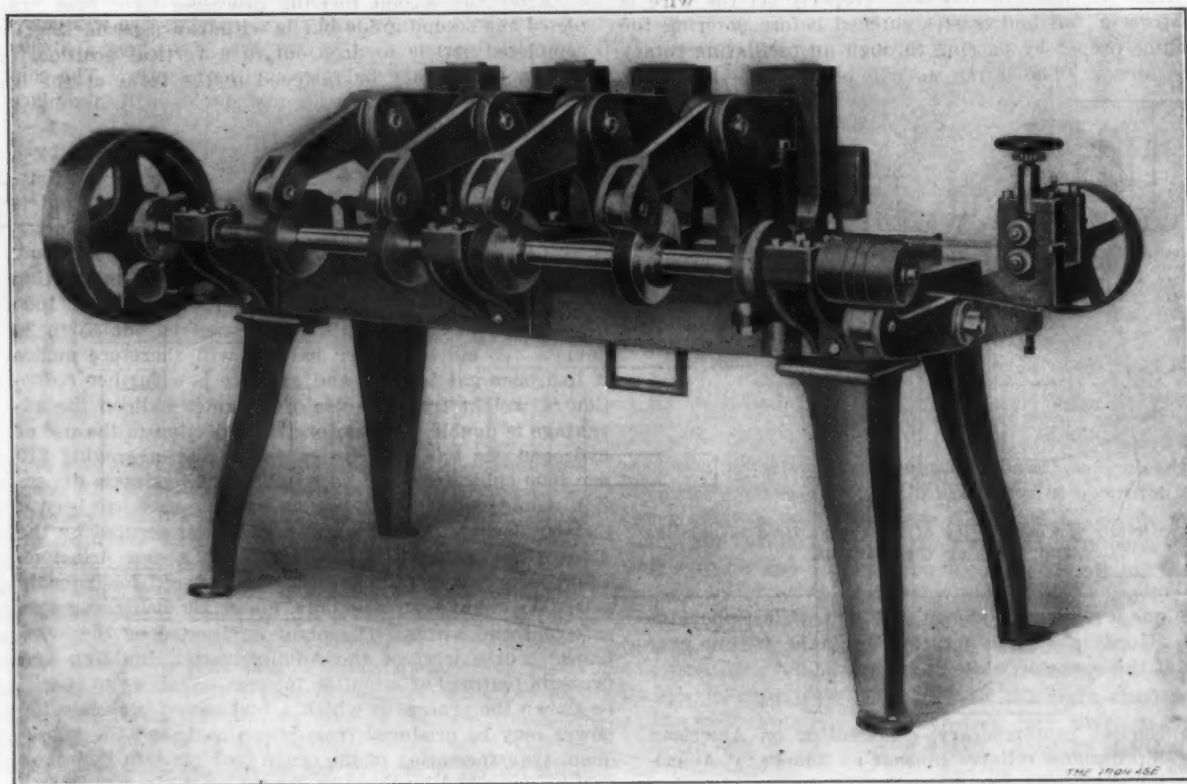


Fig. 2.—Rear View, Showing Principally the Cam Mechanism.

ppi River in Louisiana by the same method. The exhibit is of particular interest to engineers.

Charles R. Hewitt, well known in the pneumatic tool field, has accepted a position as salesman with the Rand Drill Company, and will be connected directly with the selling of the Imperial tools.

bakers' pans and kitchen utensils generally has just been perfected and placed upon the market by the F. B. Shuster Company, New Haven, Conn. The machine is unique in that it not only produces work on a considerably larger scale than has heretofore been done by automatic wire forming, but also provides for quick and easy adjustment and makes possible the production of a great variety of shapes. The particular type of this machine which is

illustrated in the accompanying engravings is equipped for rectangular shaped pan wires, although the machine is made for work either in rectangular form or any other four-sided shapes. The pan wires as shaped on this machine can be formed of any dimension not less than 4

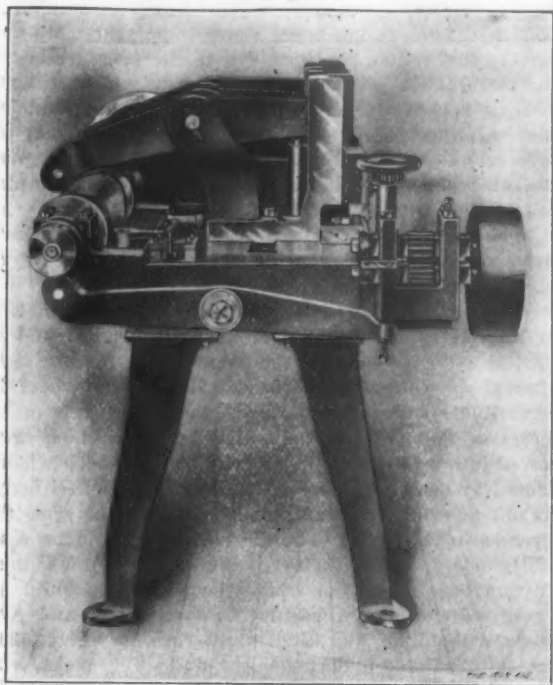


Fig. 3.—Side View of the Machine, Showing the Feeding Mechanism.

inches in width and requiring not more than 45 inches of wire.

After the machine has been properly set the wire is fed from a roll and is straightened before entering the machine proper by passing through an oscillating rotary straightener. The latter, as will be noted in Fig. 1, is

entered the machine it strikes a stop gauge attached to the frame of the right hand press, which stops the feeding of the wire and, by means of a key clutch, automatically starts the presses in operation. The work of the presses is entirely completed by one revolution of the cam shaft located at the back of the machine. When the maximum length of wire is used—that is, 45 inches—30 pieces a minute are formed, and with the minimum length, 16 inches, the capacity of the machine is 75 pieces per minute. In Fig. 1 it will be noted that a number of pieces formed on the machine have been spread upon the base underneath it. This will give a very clear idea of the nature of the product and their sizes.

In Fig. 4 the details of the various mechanical movements are shown. The movements are as follows: The wire when it leaves the rolls runs through a groove, A, in a series of three rectangular guide bars, B, which are held on a series of carriers, C, running in recesses under the press. The wire strikes a stop gauge, DD, which sets the key clutch E in operation by means of a bar at the bell crank lever F, thus setting the cam shaft in operation and working the presses. The wire is cut off by means of a knife set on the first press, which accomplishes this work on the down stroke, and the wire is left projecting from the end of the outside guide bar.

The two outside presses are first to operate and turn down the end of the wire. When this is accomplished the two end guide bars are withdrawn toward the rear just far enough to clear the wire. The two bent ends formed by the first operation of the presses constitute the lower side of the quadrangle when it is completed. The operation of the two central presses leaves in the center guide bar a length of wire corresponding to the combined lengths of the two bent ends, and bends down the wire extending beyond the center guide bar, which has been exposed by the receding of the two outside guide bars. The parallel guide, shown in Figs. 1 and 2, extending below the bottom of the bed of the machine, is for use only with larger sizes of pan wires, to insure an absolutely straight formation.

After the second forming processes have been completed the second guide bar is withdrawn, permitting the completed article to drop out in a vertical position. A V attachment may be fastened to the front of the bed

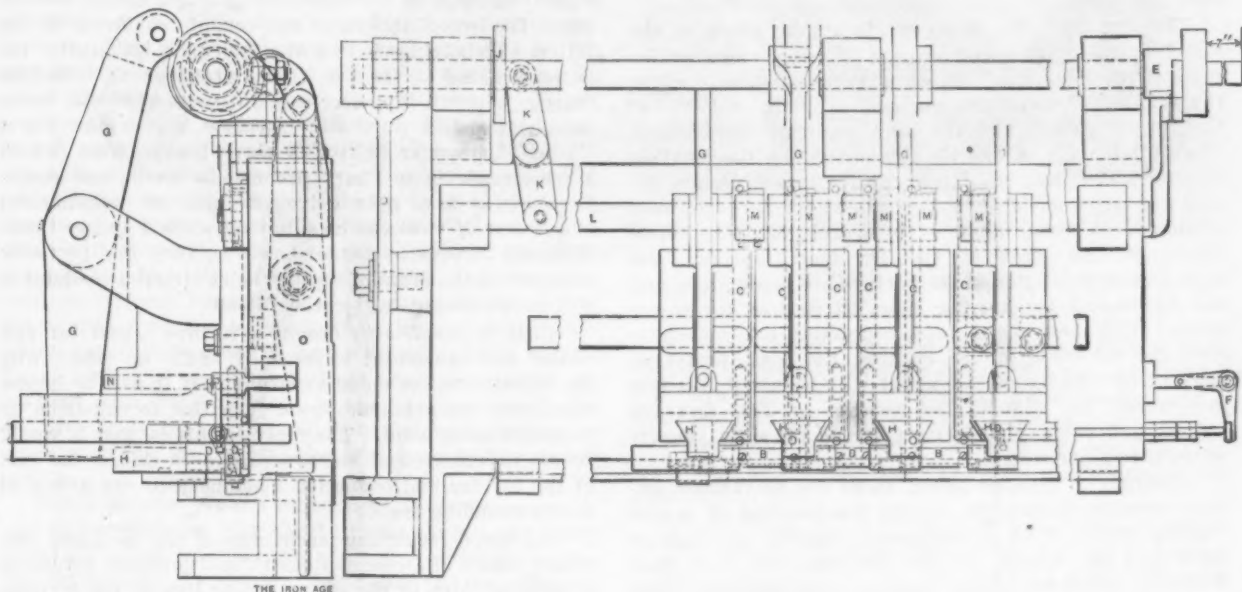


Fig. 4.—End Elevation and Plan, Showing Mechanical Details.

mounted on the pedestal placed directly to the left of the machine. After leaving the straightener the wire enters between a pair of feed rolls, which revolve continuously, but feed only while the forming presses are at rest—that is, the operations of feeding the wire into the machine and forming the wire are kept separate, the forming presses remaining at rest during the process of feeding a new piece of wire into the machine preparatory to the forming operation. When the required length of wire has

to catch the articles and stack them for convenience in handling.

The presses are adjustable and are clamped to the bed, and the cams are adjustable on their shafts, to which they are splined, and are locked by means of set screws to be in alignment with the presses.

The operation of the press cam is against the lever G G, which works a vertical slide, H carrying the forming tool. The guide bars are withdrawn by cam J operating

the lever K, attached to the bar L, having upon it adjustable cam blocks, M, which engage with carriers, C, to which guide bars are attached. The returning motion of the slide levers is by means of spring plunger N, which acts as soon as the pressure of the cam upon the press lever is withdrawn.

The feed motion is suspended while the forming is in progress by means of lever O, operated by cam on cam shaft. The instant the wire strikes the stop gauge the lever which holds the feed rolls in contact is released, and feeding ceases during the revolution of the cam shaft, but is renewed the instant the presses have performed their wire forming functions. This machine handles wire 3-32-inch diameter and lighter. A larger size will take wire from 3-16 to 5-16 inch.

The De Laval Steam Turbine.*

The De Laval steam turbine is a pure impact turbine, with a single turbine wheel, carrying one row of buckets, to which the steam is delivered in free jets at the highest possible velocity. These steam jets come from stationary nozzles, tapered so as to increase their cross sectional area toward the outlet end of the nozzle, and so calculated that the steam, before leaving the nozzle, has fully expanded down to the pressure prevailing in the exhaust chamber of the turbine, and has assumed a correspondingly high velocity, so that its whole available energy has been transformed into kinetic energy.

The velocity of the steam jets varies considerably, owing to change in pressure of the steam before entering the nozzles, to varying exhaust pressure, and to a greater or less degree of moisture or superheat in the steam. The lower limit of this velocity in general practice is about 200 feet per second, which is obtained at a steam pressure of about 45 pounds per square inch, at an exhaust pressure equal to atmospheric, and with steam containing 10 per cent. of moisture. The upper limit is about 4400 feet per second, at a steam pressure of 200 pounds per square inch, at 27.5 inches vacuum, with the steam superheated 200 degrees F. The velocity of the steam will determine the conditions under which a maximum of the transformation of the steam jets' kinetic energy into useful mechanical work can be reached, these conditions being the same as for impact water turbines.

The angle of the steam nozzle to the plane of the wheel should be as small as possible. A certain mathematical relation should exist between the nozzle angle, the velocity of the steam jet, the peripheral velocity of the turbine wheel, and the inlet angle of the buckets. The outlet angle of the buckets should be the smallest possible. Practical considerations limit to a certain degree the attainment of proper angles for the very best efficiency. A nozzle angle of 20 degrees has been established for all sizes of the De Laval turbine, the inlet and outlet angles of the buckets are made alike, and are 32 degrees for smaller sizes, 36 degrees for larger sizes. With these angles fixed, and taking into consideration the thickness of the buckets, the best theoretical peripheral velocity of the wheel will be about 950 feet per second for a steam jet velocity of 2000 feet per second, and about 2100 feet per second for a jet velocity of 4400 feet per second.

Contrary to popular belief, there are no reasons, except economical ones, to prevent the building of a safe turbine wheel with a peripheral velocity as high as 2100 feet per second. In the turbines that have been built the actual peripheral velocity varies between about 1400 feet per second in the larger sizes, and about 500 feet per second in the smaller sizes. In comparison with existing machinery and other types of steam turbines, these velocities are exceedingly high, and have necessitated the solution of some interesting theoretical problems, such as the calculating of the strains in wheels revolving at high speeds, determination of flexible shafts suitable for carrying these wheels, &c.

The diameters of the turbine wheels are such, in re-

lation to the given peripheral velocities, that the speeds run from 10,600 revolutions per minute for the largest size to 30,000 revolutions per minute for the smallest size. These speeds are reduced approximately 10 to 1, by helical gearing, giving driving shaft speeds of 900 to 3000 revolutions per minute. A single gear wheel is provided in the smaller types, and in the larger sizes they are double. If the larger types were single geared, the pressure in the pinion bearings, due to the pressure between the teeth of the gear and the pinion, would be too great at these speeds; therefore, the gears are made double, so that half the load is taken by each wheel, the gear pressure on one side of the pinion balancing the pressure on the other side, thus eliminating the pressure in the pinion bearings.

The characteristic high velocities of the principal parts of the De Laval turbine also create some interesting practical problems.

The turbine wheel is designed with a factor of safety at normal speed of about 8, and with radial and tangential stresses due to the centrifugal force constant throughout the wheel. The profile of the wheel is a logarithmic curve asymptotic to the radial axis of symmetry of the wheel section. The buckets, which are inserted into milled slots in the rim of the wheel, when actuated by centrifugal force, load the solid wheel body at its outer periphery to an amount equal to the centrifugal stresses in the body. The stresses vary with the square of the speed, and with increasing speed they will gradually increase to a point where the wheel will burst.

In spite of speed regulating mechanism and safety stops, a motor of any kind might race, as all regulating devices are liable to derangement, and safety stops, which, as a rule, are seldom used, sometimes fail to operate. To provide means for preventing serious damage in the De Laval turbine, the thickness of the wheel is reduced close to the periphery, which decreases its strength at this point. At normal speed the factor of safety is about 5; consequently the wheel will burst here at about double normal speed, and in such a manner that the rim holding the buckets is broken up into pieces so small that they cannot damage the wheel case. At the moment the rim leaves the wheel the stresses in the solid wheel body are considerably reduced the wheels become unbalanced, and as the clearance between the heavy hub of the wheel and the safety bearings in the surrounding wheel casing is very small, the hub of the wheel will come in contact with the latter, which brings it to a stop quickly. Exhaustive experiments have verified these statements. Turbine wheels without this decrease in section at the outer periphery, when purposely speeded up, would burst through the center in two or three heavy pieces, which a wheel case of ordinary proportions would not resist. Such pieces have been driven through an experimental wheel case of steel castings having walls 2 inches thick. With the wheels as made, however, they are perfectly safe, and in the event of the arm being stripped no damage will result, except to the wheel itself.

As it is possible to design a turbine wheel for any radial and tangential stresses, it might be asked why the wheels are not made so strong that it will be impossible, with the available steam velocities, to run them up to the bursting point. The reply to this is that it would be too expensive and not practicable to design the rest of the turbine and connected machinery to run safely at a corresponding speed.

The speed regulating mechanism of the De Laval turbines consists of a common centrifugal governor, actuating a throttle valve in the steam supply line of the turbine. With this the pressure can be closely controlled, but not entirely shut off; sufficient, however, to prevent the turbine going above its normal speed when running light. This is especially true of turbines running non-condensing. In condensing turbines operating with very high vacuum the passive resistances are sometimes extremely small, and even if the governor valve throttles the steam considerably below the atmospheric pressure, the remaining pressure may be sufficient, at no load, to increase the speed above the normal. To prevent this speed increase a second regulating mechanism is provided, the purpose of which is to decrease the vacuum in the wheel case.

* Abstract of a paper presented by E. S. Lea and E. Meden, June 1, 1904, before the joint convention at Chicago of the American Society of Mechanical Engineers and the Institution of Mechanical Engineers.

This apparatus consists of a small valve which is directly actuated by the governor, after its valve has been shut off. This valve either lets air into the wheel case, decreasing the vacuum, or where the vacuum in the condenser must be maintained for other machines, it admits air into a regulating valve mechanism placed in the exhaust line of the turbine. When air is let into this valve it partially shuts off communication between the wheel case and the condenser, thereby raising the pressure in the case, increasing the passive resistances of the wheel and checking the expansion of the steam in the nozzles. In case of accident to the governor valve mechanism this air valve will also effectually prevent destructive racing.

The peripheral velocity of the gear wheels is about 100 feet per second. The pinion is made of high grade high carbon crucible or nickel steel. The gear wheels are made of soft steel of low carbon. The teeth are carefully generated at an angle with the shaft center and the pitch is very small, insuring a smooth contact with a minimum amount of noise. The noise cannot be entirely eliminated, but with great care in cutting the teeth and giving close attention to alignment and center distances it has been possible to reduce it to a minimum and to a point where it is in most cases of no consequence. The gears are continually lubricated, but with a very small amount of oil. If they get the proper amount of lubrication and care is taken that no sharp grit, such as cement dust, coal dust or the like, is allowed to enter them, they will operate for many years without visible wear. The gears are encased as much as possible to prevent the entrance of dust or foreign matter. The gear wheels were originally made of bronze, but it soon developed that this material, as a rule, became crystallized after about two years of continuous operation, when pieces of the teeth were broken off and destroyed the gears. Steel gears have now been in operation for about nine years, without showing any of the disadvantages of bronze.

It has been found in a few cases that buckets have been worn out in a year, necessitating replacement. In other cases the wear has been very slight, even after a run of four to five years. The wear affects only the steam inlet side of the buckets, and will increase the steam consumption only to a slight degree. In tests made on a turbine of 100 horse-power, where the edge of the buckets had been worn away about 1-16 inch, the steam consumption was about 5 per cent. higher than with new buckets. The wheel and buckets are, however, so designed that an insertion of a new set of buckets can be easily made at a small cost.

The De Laval turbine was first used in direct connected electrical units, no difficulty being met in adapting both direct and alternating current generators for direct connection to the gear shafts at their moderate speeds. In many cases the turbines can also be used with advantage for belt transmission. However, the field to which it is particularly suited is in connection with centrifugal pumps. These pumps require certain determined velocities to enable them, at a given lift and water quantity, to give the best efficiency. With the De Laval turbine it is easy to produce the most suitable velocities; with small turbines, having one gear shaft, for all lifts from 15 feet to 150 feet, and with large turbines, with two gear shafts, for lifts from 40 feet to 300 feet.

For a greater lift the centrifugal pump has been direct connected to the high speed turbine shaft. The pump wheel will then revolve with a velocity of 10,000 to 30,000 revolutions per minute, depending on the different sizes. The pump wheel will naturally be very small, and will not produce any suction, but must be fed with another pump, which is connected to the gear shaft, running at a considerably reduced velocity. This latter pump sucks the water and presses it into the high speed pump wheel, which then gives the high pressure required. Pumps of this type have been made for lifts up to a normal head of 850 feet on a single wheel, which, at a decreased water quantity, can go up to 1000 feet, the small pump wheel giving an efficiency of about 64 per cent. They have in some cases been made, and are in operation, as boiler feed pumps. This turbine is also well adapted, on account of its high velocity, for direct con-

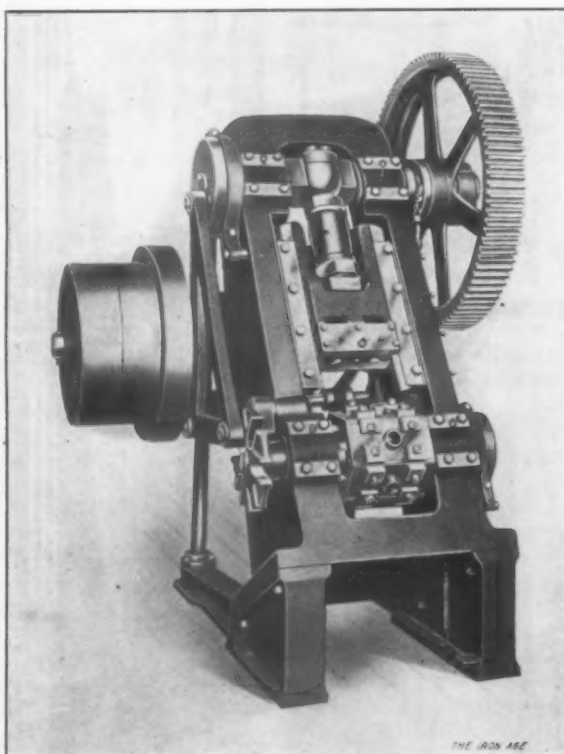
nection to blowers for all pressures above 4 inches water for which a blower can be practically built.

The steam consumption varies for the same size turbine with the steam conditions in about the same manner as for other steam motors, but the degree of variation can be considerably different for the various sizes of turbines dependent upon the diameter and speed of the turbine wheel.

The Bliss Bolt Head Trimming Press.

As a result of the general tendency in modern practice to forge bolt blanks with round solid heads, a demand has arisen for suitable machinery for the purpose of trimming these forgings to the required finished size and shape. This method of making the blanks permits of plain, inexpensive dies that are easily made and repaired. A machine such as this process has necessitated has just been perfected by the E. W. Bliss Company, Brooklyn, N. Y. As designed at present the machine is to be used only for trimming small and medium sized bolt blanks.

As will be noted in the accompanying illustration, the



THE BLISS BOLT HEAD TRIMMING PRESS.

press is set on inclined legs and provided with a horizontal six-sided revolving die holder. This is actuated by a Geneva stop motion, an automatic knockout slide and a cam actuated knockout in the die holder. A hardened tool steel pilot pin enters a hardened tool steel bushing with die holder, insuring an accurate alignment of punches and dies.

The speed at which these presses may be operated is limited only by the expertness of the operator in feeding same. They are built in four different sizes, weighing from 3200 to 12,000 pounds. The illustration shows the largest size now built. This press will trim at each stroke two heads of bolts $\frac{5}{8}$ x 3 inches; size of bolt head square, 1 1-16 inch; thickness of bolt head, $\frac{5}{8}$ inch.

The United States Steel Corporation have rented the fourteenth floor of the Chemical Building at St. Louis, where all the local offices of constituent companies will be concentrated. Heretofore the offices have been scattered throughout the business district. This move is in line with the policy of the corporation to locate all of the offices of the constituent companies in each city in the same building.

A New Horizontal Drilling and Boring Machine.

A short time ago a line of drilling and boring machines was designed for their own use by Pawling & Harnischfeger of Milwaukee, Wis. Being of a style not generally built for the market the firm soon met with considerable demand for duplicates, with the result that they have decided to build the machines and place them on the market. They are made in several styles and can be used as either stationary or portable tools having various forms of tables and mountings. A typical style, which is shown in the accompanying engraving, is known as the No. 4 machine.

This machine as shown is driven by a special multiple

along the base plate or slide respectively. They are controlled by means of levers A, B, C, which connect to the splined shafts running along the left hand side of the column. The spindle carriage is fitted with adjustable gibs and is counterbalanced to make the work of raising and lowering as light as possible. To secure extra close vertical and horizontal positions these movements are arranged so that exact adjustment can be made by hand. All movements can be controlled and all adjustments can be made without the operator being compelled to leave his position at the drill spindle. For operating the drill spindle by hand the hand wheels D and E, which control the worm and worm wheel respectively, are used, while the lever G serves for hand adjustment of the spindle

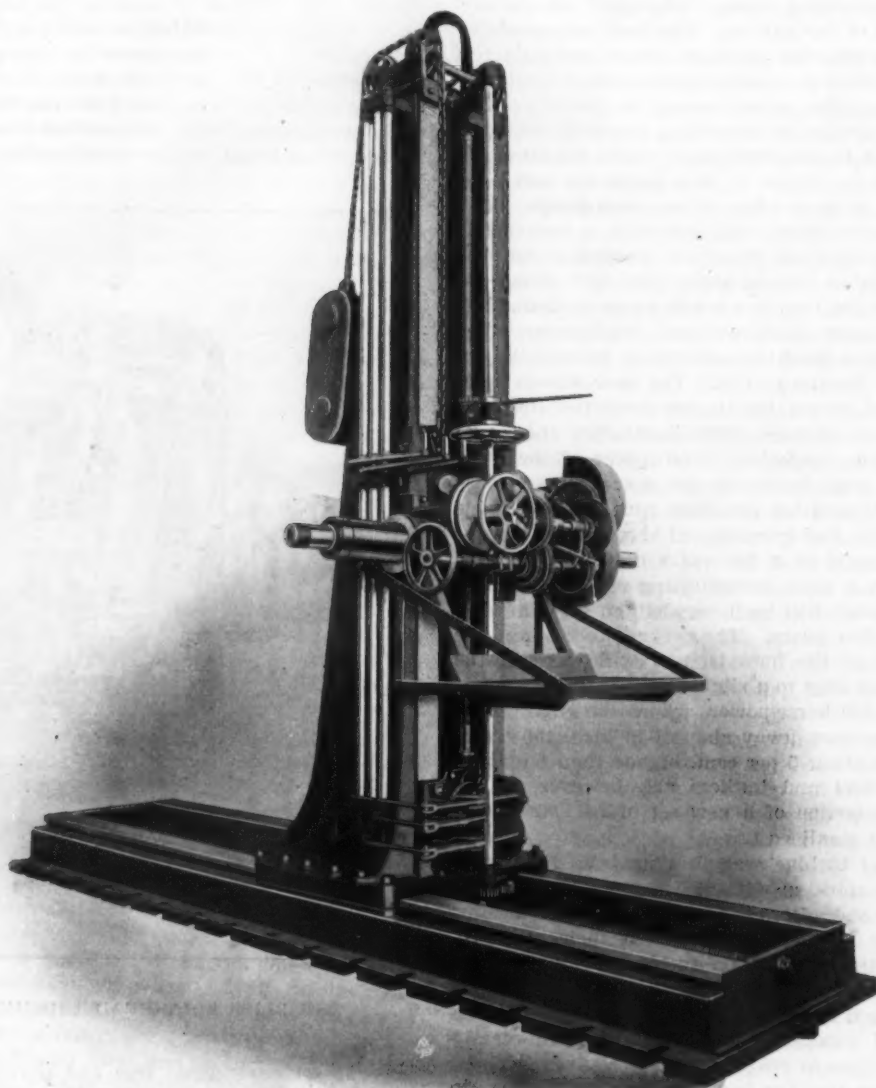


Fig. 1.—The Pawling & Harnischfeger Horizontal Drilling and Boring Machine.

voltage motor arranged to run from 310 to 1450 revolutions per minute, but the drive can readily be arranged for a constant speed motor operating through variable speed transmitter to obtain the same range of speed and variation. The machine can be used as a portable or stationary drill, and is supplied with or without the sliding base or with the work table on wheels. A large shackle at the top of the machine is provided for lifting the machine by means of the crane. The general appearance of the machine is shown in Fig. 1, and the details of construction are shown in the side and end elevations, Figs. 2 and 3.

The driving mechanism for the three principal movements of the machine is located at the base of the column and consists of three reversible clutches, *a*, *b*, *c*, these being for operating the drill spindle, for raising and lowering the spindle carriage and for moving the column

carriage as to height, and the hand wheel H is used for moving the column along the base or slide by hand.

The spindle is forged from carbon steel and has a diameter of 3 11-16 inches at the front bearings. It is carried by a long sleeve 7 inches in diameter and fitted with bronze bearings. The feed or traverse is 24 inches, and the front end is bored to fit a No. 6 Morse taper socket. A cap nut is also provided for holding small special boring bars or other tools, so that work can be faced or counterbored from the back and the spindle and feed motions reversed. The speed range extends from 6 to 180 revolutions per minute, and can be split up into 36 steps, varying geometrically when a multiple voltage drive is used into any number of steps with a constant speed motor and variable speed transmitter. Six feeds are provided for each spindle speed, varying from 0.007 inch to 0.25 inch return, suitable for drilling, boring or

reaming. The speeds are variable and reversible without stopping the machine. The feed mechanism, as will be seen, is operated through bevel, spur and spiral gearing, and can be changed instantly by means of the levers F and f. The spindle or feed can be quickly returned or advanced to any position and the clutch backed or locked without the operator taking his hand off the hand wheel. The thrust due to feeding is taken by a ball bearing.

The column is moved along the base plate or slide on screw J, and for carrying the machine about by means of crane shackle K is used. It will be noted in Fig. 3 that the machine has a vertical spindle range of 7 feet 6 inches, extending from 3 feet 4 inches, the lowest operating height above the floor line, to 10 feet 10 inches, the highest operating height above the floor line. The height

are 33 inches in diameter, the stroke is 41 inches, and the engine operates at 135 revolutions per minute.

We are informed by the Atchison, Topeka & Santa Fe Railroad that, in spite of the machinists' strike in force on their road, all of their shops are in operation, some of them with practically a full complement of men and others nearly so, and that they have sufficient men now to do all necessary work and to keep their equipment in good order. The strike, in the first place, was not for an increase in wages, ostensibly at least, but for a classification of men that would mean an increase in wages, as the classification of machinists insisted upon by the unions was such as to entitle almost any man working in

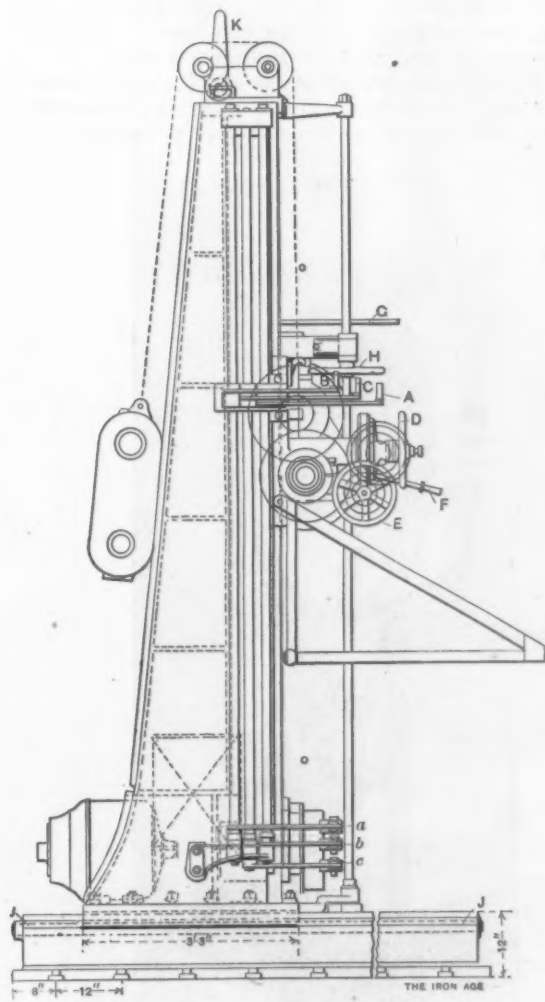


Fig. 2.—Side Elevation.

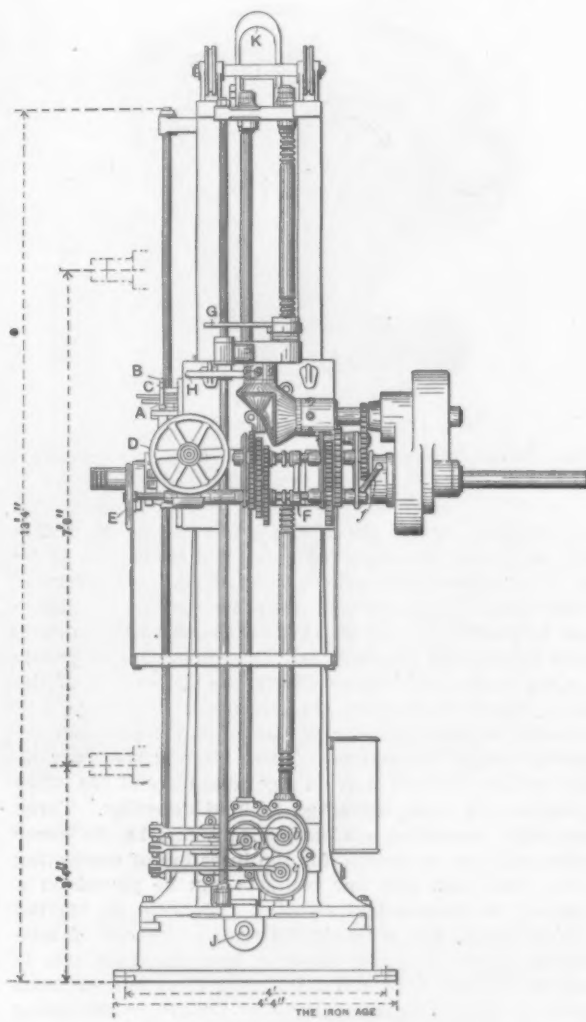


Fig. 3.—End Elevation.

THE PAWLING & HARNISCHFEGER HORIZONTAL DRILLING AND BORING MACHINE.

from the base or slide to the top of the column is 13 feet 4 inches, and the horizontal travel of the base plate is 10 feet 10 inches. The base plate is 4 feet 4 inches wide, 12 inches deep and 14 feet 8 inches long. The height of the machine over all is 14 feet.

A recent 1200 horse-power Deutz blowing engine contains four power cylinders, placed in pairs opposite each other. Each of the cylinders acts on the "four-cycle" system, so that with each stroke one of the cylinders is acting. The admission valves are above and the exhaust valves below the cylinders. A regulator is supplied for each pair of cylinders and controls the gas supply, with the advantage that the proportion is automatically varied according to the constantly changing quality of the gas of the blast furnace. The weight of the machine is 219 tons, of which 19 tons are in the fly wheel. The cylinders

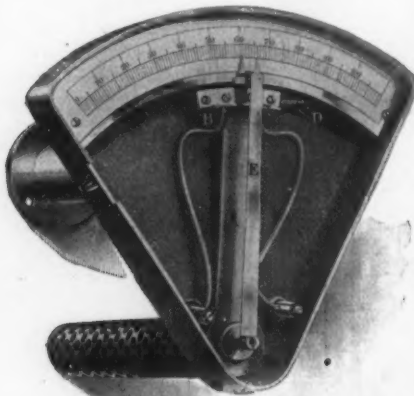
a machine shop to machinist's wages. The demand of the union also sought to limit the number of apprentices, and to hedge about the management with a number of shop rules that would practically place the control of the shops in the shop committee, instead of in the foreman or the railroad officials. During the discussion leading up to the strike the company maintained that they were paying higher wages than machinists were able to obtain from other companies in the same localities, and that their treatment of their men was such as to stimulate individual ambition and loyalty on the part of the workmen, engendering a spirit that could not exist in case the rules proposed were put in force.

The F. E. Williams Company, New Haven, Conn., dealers in iron and steel, have acquired a property on East street, in that city, and will occupy it in their business.

The Bristol Thermometer-Thermostat.

The Bristol Company, Waterbury, Conn., are placing a new instrument upon the market which is a combination thermometer and thermostat. There is a demand for an instrument of this character, which will give correct indications of the temperature of the atmosphere, gases or liquids at all times, and also serve as a thermostat to make electric connection at any predetermined limits of temperature for the purpose of operating controlling apparatus, alarms and the like.

The instrument is provided with a 6-inch scale graduated in degrees Fahrenheit. The construction and capabilities of this instrument will be understood by referring to the accompany engraving, in which A is an arm pivoted at the lower portion of the case, terminating in a



The Bristol Thermometer-Thermostat, with Front Casing Removed to Show the Working Parts.

point resting on the arc of the graduated scale, and is held by friction at whatever point it may happen to be set. Two adjustable contact pieces, B and C, are carried by this arm. These contact pieces are capable of adjustment by means of a screw, D, which is threaded so as to cause the contact pieces B and C to approach or recede at equal rates and distances from the center line of the arm A, upon which they are supported. They are also connected to binding posts as shown, which are used for making outside connections. These binding posts are located within the case to avoid any possibility of the wires or connections being disturbed without detection. Three holes with insulating eyelets are provided in the lower portion of case, as shown, for the insertion of connecting wires. The high and low contacts can be placed on a single or on independent circuits. The arm E, moving over the graduated scale, indicates the changes of temperature where the instrument is located. This arm is operated by one of Bristol's recording thermometer tubes placed in the perforated protecting projection extending from the back of the case, as shown in the illustration. On the back of the indicating pointer E there is a raised portion, which makes electric connection with the contact pieces.

A novel feature of the instrument is that the temperature indicating arm, E, is not restrained by the thermometer-thermostatic contacts. Thus, it will be seen that the controlling effect of the thermostat is perfectly adjustable as to position on the scale of the thermometer, and also as to high and low limits of operation, without in any way interfering with the correct indications of the thermometer in case the temperature does not remain, or is not controlled, within the limits for which contact pieces may be set. The instrument may be readily applied to liquids, as, for instance, to indicate the temperature, and set into operation controlling apparatus for the brine in a refrigerating system or tank. For temperatures above the atmosphere, as that occurring in ovens, kilns, closed spaces or of liquids in pipes under pressure, a small bulb is located within the closed space or pipe. This bulb is connected with the thermometer-thermostat by a capillary tube filled with alcohol. The temperature at the bulb is communicated to the instrument, which may be located at any convenient point for

observation. The electric wires connecting with the adjustable thermostatic contacts may be carried to any point where the controlling apparatus may be located or where it is desired that an alarm shall be given.

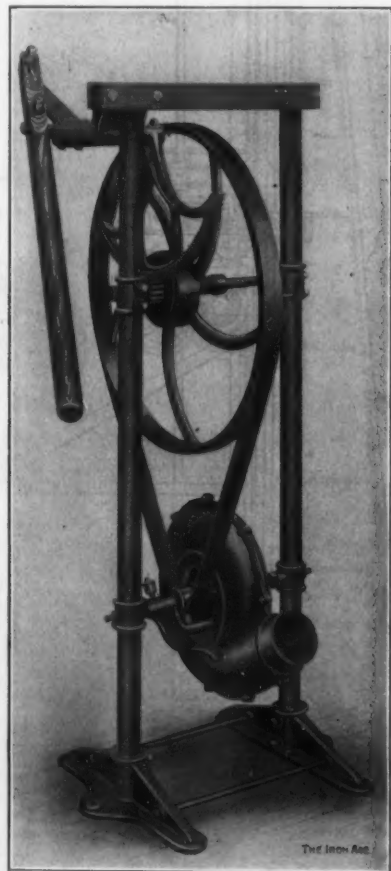
A New Sturtevant Hand Blower.

The B. F. Sturtevant Company of Boston, Mass., have just perfected a new design of hand blower, known as Style B, which contains several improvements on their former style of blower of this type.

These blowers have been extensively introduced in connection with new forges of all kinds, and have likewise been applied to old style brick and iron forges as simple, efficient and economical substitutes for the bellows. Not only are they adapted to forge blowing, but they can readily be applied as portable ventilating apparatus.

They are simple in design, strong, rigid and compact, easy and economical in operation and readily portable. The running gear is simple, effective and strong.

The blower is adjustable on the shaft, and its outlet may thus be set to discharge in any direction and readily connected to the forge tuyere by means of galvanized iron



THE STURTEVANT HAND BLOWER.

pipng. The blower is of cast iron, has a steel shaft running in babbitted boxes and a fan wheel of galvanized steel riveted to a composition hub with extending arms.

The frame is so arranged that the slackness of the belt driving the blower may be taken up by lowering the blower shaft, which is supported by collars sliding on the frame. The feet are provided with holes so that the hand blower may be readily screwed to the floor.

These blowers are made in two sizes. The total length on the floor of Style B-1 is 18 inches, while the total height of the frame, not including the handle, is 48 inches. The driving wheel is 24 inches in diameter, the blower outlet is 3½ inches in diameter, and the complete outfit weighs but 135 pounds.

Style B-2 is of slightly larger dimensions and has proportionately greater capacity for delivering air. The driving wheel is 24 inches in diameter, the blower outlet is 4¼ inches in diameter, and the complete outfit weighs 155 pounds.

The Landis Bolt Cutter.

Ever since the organization of the Landis Machine Company of Waynesboro, Pa., considerable interest and speculation have been shown in the machinery trade as to what the product of the new company would be. This was due chiefly to the close connection of the company with the Landis Tool Company of the same city, and to

lines, the principal feature of which is a new form of chasers.

Bolt cutters, ordinarily, have chasers that open and close on radial lines, having the cutting teeth hobbled on their ends and do the cutting against the sides of the chaser, and these after grinding in the throat a few times, in resharpening, lose their length of leading thread and then require annealing, re hobbing, redressing the throat

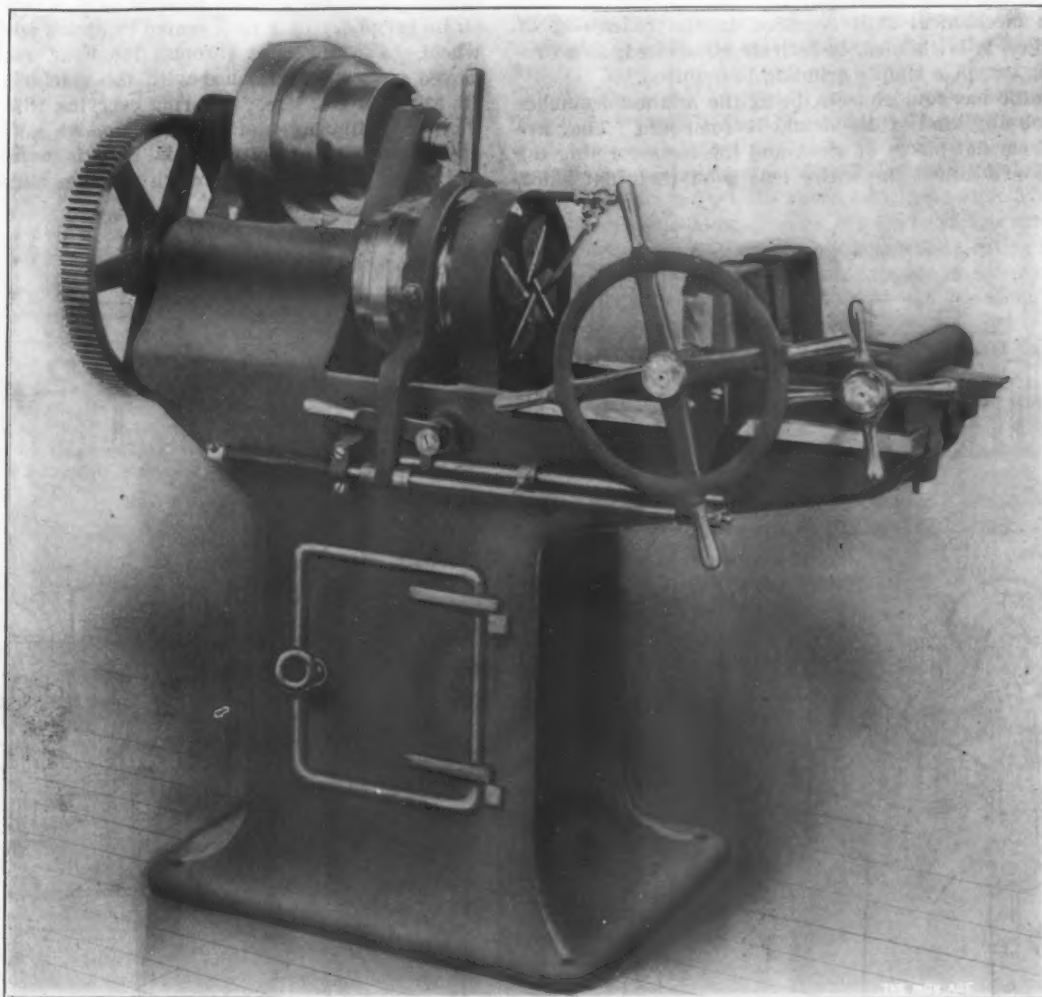


Fig. 1.—General View of the Machine.



Fig. 2.—Head of the Machine, Together with Extra Chasers and a Set of the Grooved Blocks Which Hold Them.

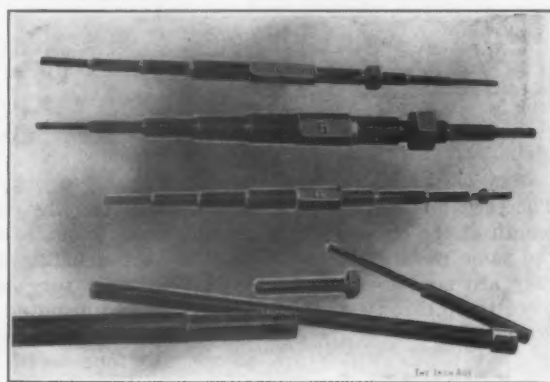


Fig. 3.—Samples of the Work Performed Upon the Machine.

the fact that A. B. Landis, the designer of the Landis grinder and superintendent of the Landis Tool Company, is also the superintendent of the Landis Machine Company.

The products of the new company are to be bolt cutting and nut tapping machinery, and the former line is now sufficiently perfected to warrant its first exploitation.

The Landis bolt cutter is a machine designed on new

and cutting edges and retempering, all of which must be done by a mechanic with great care, and in the retempering of chasers great risk of cracking or springing is encountered, hence a great loss of time and expense in getting a set of chasers in proper shape. This is not the case with the Landis chasers. They are set on tangent lines to the bolt being cut. The teeth are cut on the side and the cutting is done on the end. The teeth are milled

the entire length and the chasers are set in their blocks on angles agreeing with that of the thread to be cut.

The cutting clearance, it is claimed, is perfect on the cutting teeth, and the same teeth at all times do the cutting, while the back teeth engage the threads of the work just back of the face of the chaser and form a permanent lead nut, with the amount of leading surface never varying, thus controlling the lead of the screw. These leading qualities always remain the same, as no grinding in the throat of the die is required.

The mechanical skill required in the redressing of other dies, it is claimed, is entirely eliminated, as no redressing except a simple grinding is required.

The die has four chasers, being the minimum number of which any kind of die should be composed. They are made from flat pieces of steel, and the teeth forming the threads are milled the entire length on their flat sides.

head to match the pitch of the chaser engages by means of its grooves the teeth of the chaser and draws the same to a seat in the bottom of the slot, as well as presses it against the sides of same by the angle of the threads on the chaser, making it rigid with the block. The spindles are connected by a central pinion, having a hole through its center to admit the passage of rods or bolts being cut.

The faces of the teeth on these spindles and pinion are very wide, giving great strength and durability. The central pinion has a wheel secured to it, which is engaged on its periphery by a rack seated in a ring encircling said wheel. A screw runs through the rack, which can be moved by a key furnished with the machine, to set the die to the proper size. The ring carrying this rack has a limited oscillating motion, which opens and closes the die when cutting bolts. This ring is oscillated by a sliding ring on the head, which operates through a rack

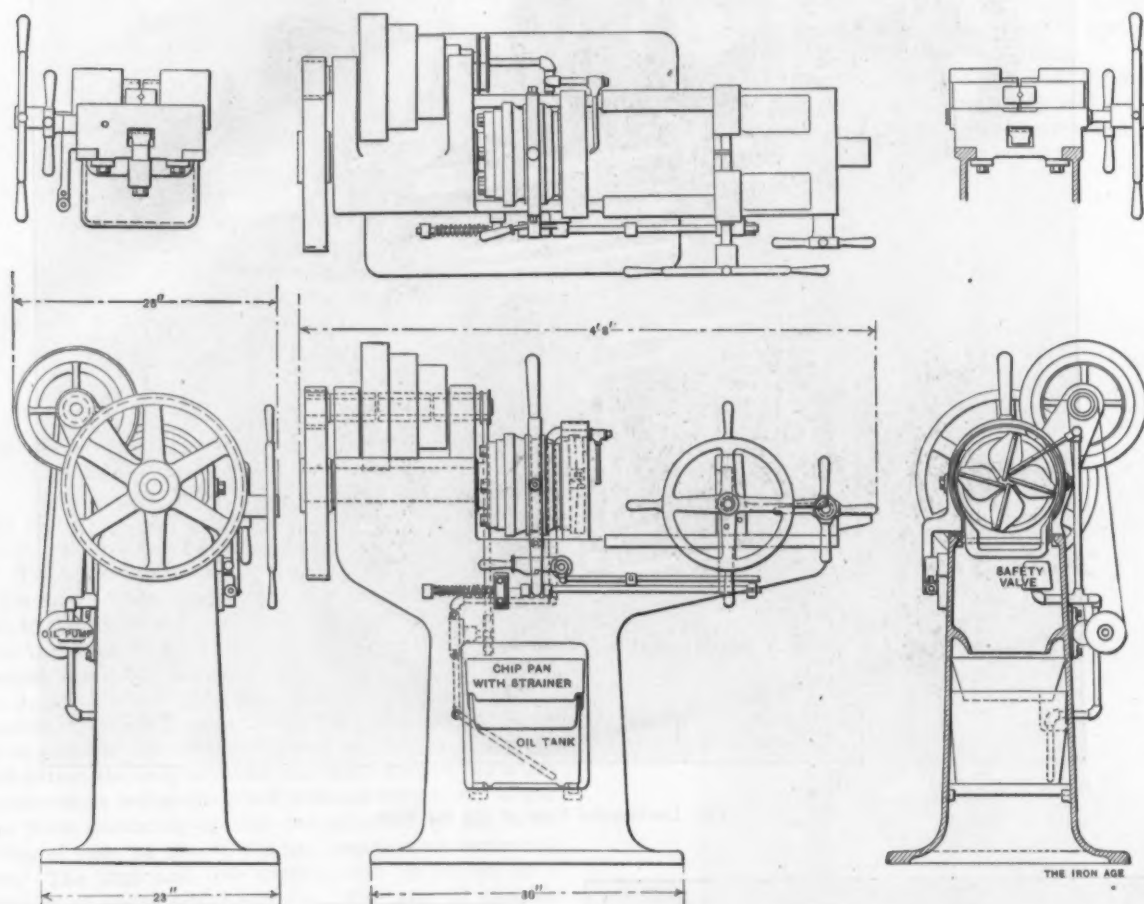


Fig. 4.—Plan, Rear, Side and Front Elevations and Sections of the Machine.

THE LANDIS BOLT CUTTER.

The throat is formed by a bevel on the edge the entire length of the chaser. This gives uniform shape, so that the same results are obtained after each grinding until they are used to their limit. This leaves a very small piece to be thrown away. The cutting and grinding are done on the ends of the chasers. The chasers are held by grooved blocks which are secured to four oscillating spindles, which are geared together in the head and are made to operate simultaneously to open and close the die and to adjust it to proper size. These blocks are interchangeable, fitted neatly to hardened pins, which are pressed to the spindle ends and are secured by screws to their ends, which are quickly changed from one size to another.

The blocks slip on and off the pins with ease. The chasers, as said, are held in grooves in the blocks, and are backed on the opposite ends from which the cutting is done by a screw which engages threads on the sides of the slot of such length as to use up the chaser to its minimum length. A screw having an annular grooved

secured to the ring, operating a pinion seated in the head, which engages a gear toothed head on a pin connecting two toggle links, one of which is connected to the oscillating ring and the other to the head. When the die is closed the links are on a straight line with each other and make a positive lock of the die, without any tension whatever on the sliding or wearing surfaces, thus assuring durability.

The racks, gearing, link and pinion are all inclosed within the head, and it is impossible for cuttings, scale or chips to get to them.

The sliding ring on the head is moved by a yoke, engaging segmental blocks by a screw, which blocks engage the ring by its grooves. This yoke is pivoted to the bed and is arranged for actuation in opening and closing the die by hand and automatically by the movement of carriage. A rod with adjustable stops enables the proper setting for opening and closing the dies when desired.

The carriage is of improved form. The vise has guides centralized over the bolt being held, eliminating

the side thrust. The rack is central on the machine, and immediately below the line of the bolt being cut.

The details of construction of the head are shown in Figs. 5 to 13, inclusive, as follows: Fig. 5 shows rear of

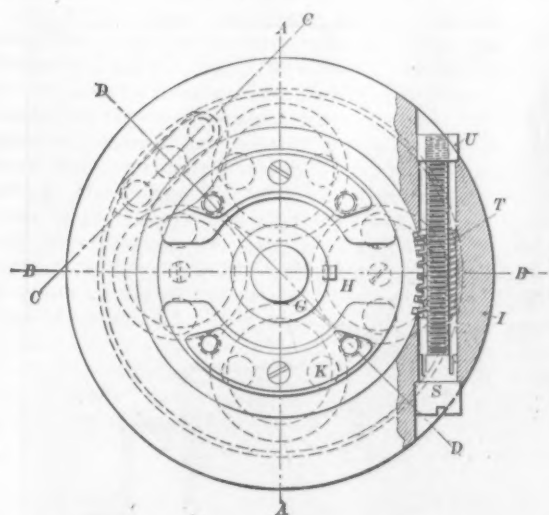


Fig. 5.—Rear of Head with Flange Removed, Showing Section through Adjusting Rack for Adjusting Die to Size.

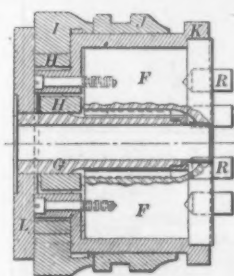


Fig. 6.

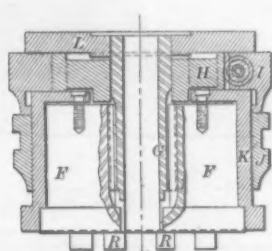


Fig. 7.

Sections through Head on Lines A A and B B, Respectively, in Fig. 5.

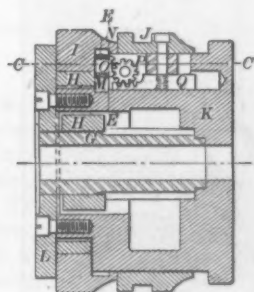


Fig. 8.

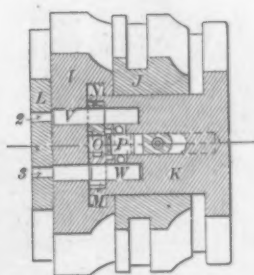


Fig. 9.

Fig. 8 is a Section through Head on Line D D in Fig. 5; Fig. 9 is a Section on Line C C in Figs. 5 and 8.

which is connected to a ring, J, which slides longitudinally on the head by yoke which engages its groove. This ring in one position sets the toggle links on a straight line (Fig. 12) when the die is closed, eliminating all thrust upon said ring while cutting threads. Opposite position sets links as shown in Fig. 13, which opens the dies. Fig. 9 shows section on line C C of Figs. 5 and 8, and shows the pins on which the toggle pins are mounted. As shown, pin V is mounted in ring, with pin projecting to receive link N, and pin W is mounted in the head K, projecting to receive link M. This position of the pins is arranged to open and close the head for right hand dies. For left hand dies the position of these pins is reversed, namely, the pin V is pushed into the head through hole 2 and pin W is pulled out (by means of a screw furnished with the head) into the ring I. This gives the opposite motion of the die trunnion. The die chasers for left hand cutting are made just the reverse to those shown in Fig. 11, although the same chasers can be used by cutting on the opposite end, as they are hardened their entire length. The flange L being drilled and tapped, is secured to a flanged spindle of the machine and can be mounted on any other machine desired.

The machine is furnished with positive oil pump of rotary type; the oil tank and cuttings pan and screen are located inside the base, both of which can easily be removed for emptying and cleaning.

When so desired, pipe dies will be furnished which can be used on the same heads.

The whole machine has been carefully designed with a view to convenience, durability and efficiency.

A. B. Landis, the patentee of the machine, has spent

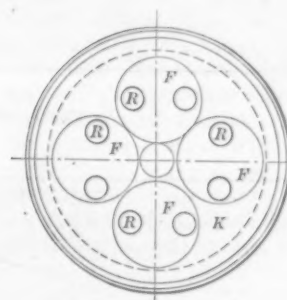


Fig. 10.

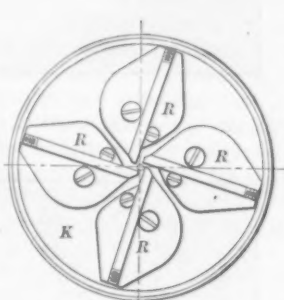


Fig. 11.

Front Views of Head with Blocks R Removed (Fig. 10) and with Die in Place (Fig. 11).

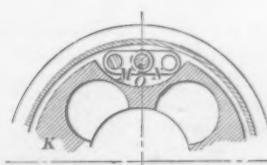


Fig. 12.

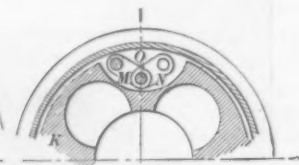


Fig. 13.

Section on Line E E of Fig. 8, With Die Closed and Open, Respectively.

THE LANDIS BOLT CUTTER.

head with flange L removed, showing section through adjusting rack for adjusting die to size. Fig. 6 is a section through Fig. 5 on line A A, showing the die trunnions F F and the central hollow pinion G engaging said trunnions by gear teeth, shown also on Fig. 5, by which the trunnions are turned by the central pinion. Fig. 7 shows the section across the adjusting T on line B B of Fig. 5. The rack engages wheel H, which is keyed to the central pinion G, by which the trunnions are firmly held in position. The rack T is seated in the ring I, which is caused to rotate by the toggle links M N, shown in Figs. 12 and 13. These toggle links are moved to the two positions shown in Figs. 12 and 13 by a pinion, P, Fig. 8, seated in the head, which engages the head of a toggle pin connection of the two links. This pinion is revolved by rack Q,

several years in developing it, and has given it the most detailed attention in connection with the shop work, so as to insure the fullest development of every particular.

The company are going ahead to get out larger sizes with single, double and triple heads. They also expect to be in the market shortly with a nut tapper.

The new form of die is the result of long and careful study on the part of Mr. Landis, and the first machine made of this type has now been in use for several years, and the results, it is said, have been eminently satisfactory.

In Fig. 3 A was cut with $\frac{1}{2}$ -inch 13-T. U. S. S. die, B with $\frac{3}{8}$ -inch U. S. S. die and C with $\frac{1}{4}$ -inch 20-T. U. S. S. die. A rod several feet long was cut, the pitch not varying 1-100 inch in 2 feet.

The Gould & Eberhardt Rack Cutting Machine.

The accompanying illustrations show the front and rear views of a new 6 foot by 8 inch light pattern entirely automatic rack cutting machine just completed by Gould

and one finishing cutter placed side by side; six pitch with a gang of three finishing cutters, eight pitch with four cutters, &c. Gang cutters which are used on these machines have their cutting points set spirally, and thus avoid chatter and rapid dulling of the edges. The rack

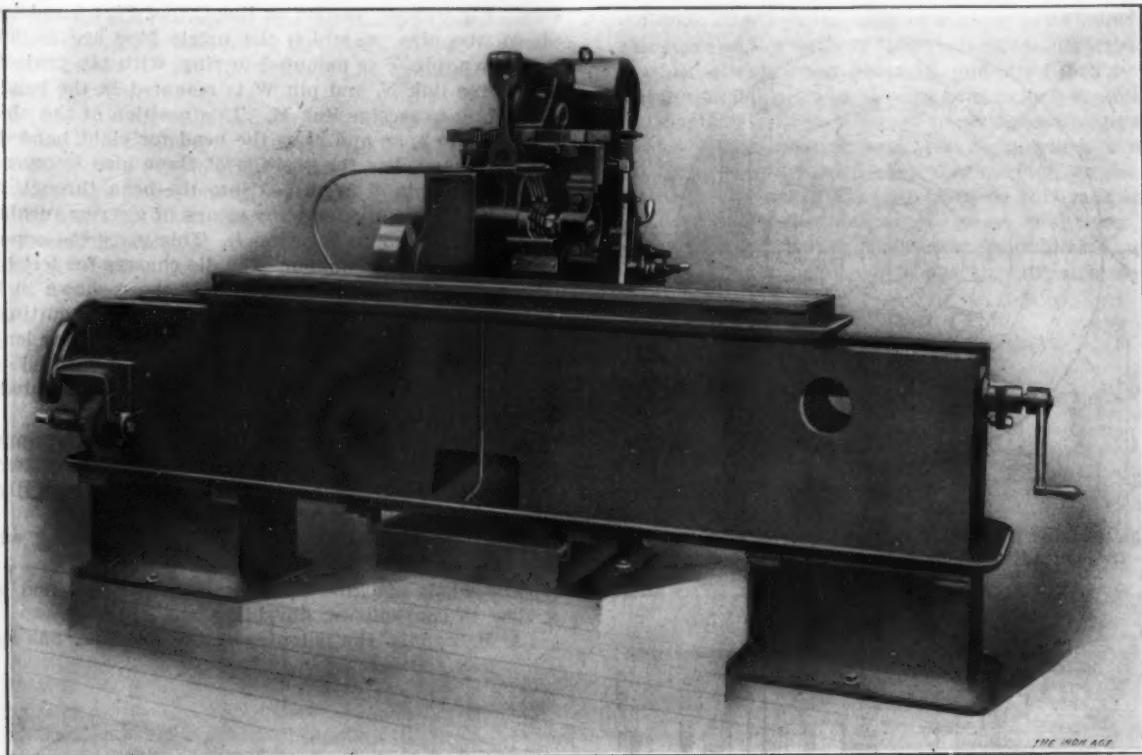


Fig. 1.—Front View.

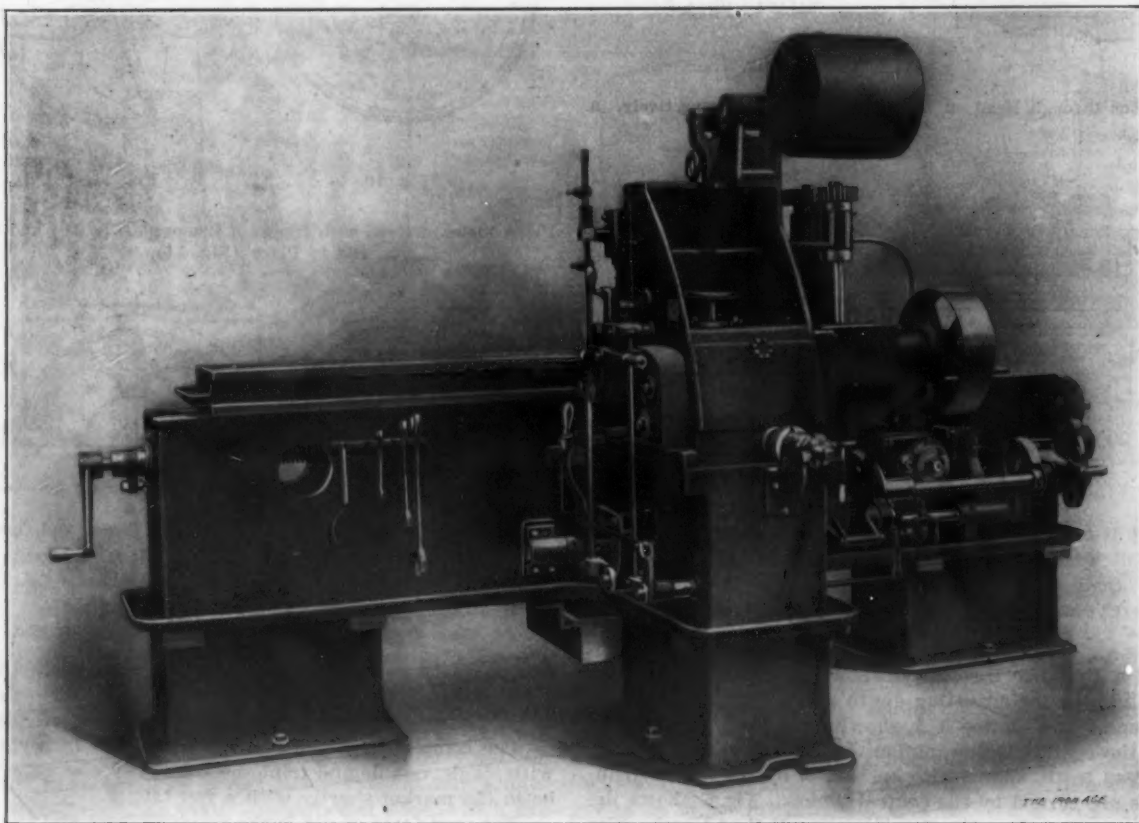


Fig. 2.—Rear View.

& Eberhardt, Newark, N. J. This machine is intended for light work, such as small printing press racks, notching scale beams and similar work where great accuracy is required. It has a capacity for cutting racks as coarse as three pitch, using a gang composed of one roughing

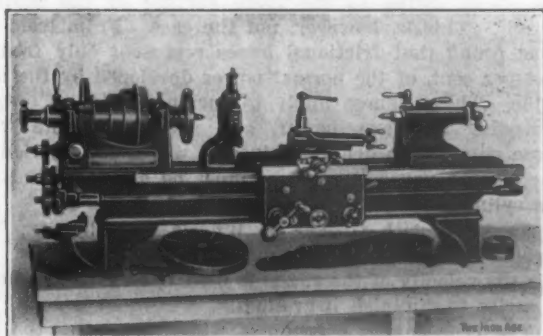
blanks are held in a vertical position, and consequently the cutter slide travels vertically. The funnel shaped receptacle or opening is located under the cutters, into which chips, oil, &c., drop and are carried to the bottom of the machine, where the oil is separated and pumped

again to the cutters. The cutter slide is counterbalanced, and is so arranged that it cannot possibly feed downward unless the proper divisions and all previous movements have been completed. The machine can also be arranged to operate semi-automatically if desired.

By a very ingenious arrangement on the end of the machine it can be set to divide for either circular or diametrical pitches, using the same lead or dividing screw. It can also be arranged for metric divisions instead of English inch measurements when desired. The cutter spindle is geared very strongly, and as it is driven by worm and worm wheel affords a very smooth and steady drive. The top of the table is T-slotted, and with the vises for holding the rack blanks affords a means for cutting any thickness or specially shaped rack within the capacity of the machine. Any length of rack can be cut by resetting, and the table can be geared to use the traveling movement in either direction, saving wear on the various parts and obviating the necessity of returning the table every time a new blank is set. The table stops automatically at each end. The light pattern machine is made in 4, 6 and 8 foot lengths.

A New Screw Cutting Bench Lathe.

To meet a growing demand for an accurate and reliable bench lathe that can be bought at a moderate price and at the same time is a complete screw cutting engine bench lathe, suitable for laboratory, electrical, optical and experimental work, the new screw cutting bench



THE STAR SPECIAL SCREW CUTTING BENCH LATHE.

lathe shown in the accompanying half-tone has been designed. The manufacturers claim that much work that is now being done on large tools can more profitably be done on this lathe.

The head stock has large hollow spindle, made from a crucible steel forging, with draw-in chuck for split collets up to $\frac{1}{2}$ inch capacity; phosphor bronze boxes with improved end thrust ball bearings; the cone pulley has three steps for wide belt, and, with strong back gears, gives six changes of speed; a push pin on the head gear allows the cone to be instantly locked or unlocked without using a wrench. The tail stock is of the curved or cut under pattern, which allows the compound rest to swing around parallel with the ways and over the base of tail stock, with room to operate feed screw handle; the spindle has an improved locking device, and the tail stock is provided with side adjusting screws for turning tapers, has a long bearing on the bed and is locked in such a manner as to render it firm and rigid.

The carriage has long bearing on the ways, is gibbed to bed both front and rear. A cam locking device locks carriage to bed when using cross feed. The cross feed screw has a graduated collar which reads in thousandths of an inch and can be set at zero in any position. Plain and compound rests are regularly furnished and easily interchange. The base is graduated 180 degrees and renders the compound rest capable of fine adjustment. The tool post has patented collar and shoe, which exclude all dirt and chips, and admit of quick, easy and secure adjustment of the tool. If desired, a European tool post is furnished in place of the regular tool post.

The automatic cross and longitudinal feeds are actuated by a phosphor bronze worm on the lead screw, receiving its power from the head spindle through spur gears; the lead screw is splined and simply acts as a feed rod, therefore the only wear on the threads is in screw cutting. The automatic feeds are almost indispensable for a large variety of work, as they secure more accurate and smoother surfaces. The range of feeds is very large. The range for screw cutting is extra large, cutting all standard threads, right or left (including $11\frac{1}{2}$ and 27 inches), from 3 to 64, without compounding the gears and nearly all threads by compounding. When it is desired to cut both standard and metric threads, transposing gears and index for cutting international standard metric threads from 0.5 mm. to 8 mm. are furnished. The lead screw is cut from a master screw by a new process from 30 per cent. carbon steel, making an accurate, durable and most desirable lead screw. When it is desired to cut metric threads only, metric lead screw and index are furnished in place of the regular lead screw and index. Patented spring nuts are used in connection with split washers to hold the change gears in place. They are easy and convenient to operate and allow quick shifts of the change gears.

The bed is 46 inches long, broad, deep, thoroughly well braced and accurately proportioned throughout. The rated swing is 9 inches, but has an actual swing of $10\frac{1}{8}$ inches over bed and 24 inches between centers. The countershaft has friction clutch pulleys easy to operate, and also has self aligning and self oiling shaft bearings. The pulleys and friction bands are provided with self closing oil cups.

Each lathe is furnished with large and small face plates, center rest, follower rest, two hardened and ground point centers, a full set of change gears and wrenches. Extra attachments (taper attachment, milling and gear cutting attachment and blocking) can be furnished when desired. While these lathes are designed for working metals, with the addition of a hand rest, screw chuck, cup and spur centers, are suitable for wood turning.

The lathe is made by the Seneca Falls Mfg. Company, 255 Water street, Seneca Falls, N. Y.

In a recent address, Mr. Balfour, Prime Minister, stated that in 1870 the foreign commerce of Great Britain was 25 per cent. of that of the entire world, while in 1895 it was only 18 per cent.; in the same time the commerce of the entire British empire fell from 35 per cent. of the world's total to 31 per cent. Subtraction shows that the commerce of the British colonies was augmented during this period from 10 per cent. of the world's commerce to 13 per cent. During the same period of a quarter century British exports increased 13 per cent.; Russian, 17 per cent.; French, 20 per cent.; German, 43 per cent., and American, 110 per cent.

Mexico has an advantage over many other countries in the great variety of climate to be found within the limits of its territory. It not only possesses hot lands proper to its geographical position in the tropics but also lands in which the products of more northern and colder climates can be grown without the fear of the intense frost and snow, so common in northern latitudes. The coldest temperature in the Valley of Mexico, nearly the highest plateau of the republic, over 7000 feet above sea level, during the past ten years, has been 5.4 degrees below zero, Centigrade, equal to 22 degrees above zero, Fahrenheit, and that occurred in only one instance.

The Central Metal & Supply Company, Baltimore, Md., have reorganized and have increased their capital stock from \$50,000 to \$75,000. In the great Baltimore fire their plant was destroyed, and they will erect a new warehouse as soon as the plans are completed. The company carry a full stock of brass and copper goods, pipe, fittings, valves, tools, plumbers' and steam fitters' supplies.

Different Applications of Steam Turbines.*

In common with all other steam engines, turbines transform into mechanical work the energy given out by steam during its expansion from the initial pressure of admission to the pressure at the exhaust. But while reciprocating engines effect this transformation of energy by means of variation in pressure of the steam, turbines can effect it both by means of the pressure and by means of the velocity of the steam while expanding. The employment of the velocity only in each moving wheel characterizes the action of impulse turbines, among which may be cited the Laval and Curtis turbines, as well as that designed by the author; while the simultaneous employment of the velocity and partial use of the pressure characterize the reaction turbine, of which the best known type is that of Parsons. Whatever the method in which the steam acts the chief problem is the employment efficiently of the very great velocities attained by steam in expanding. When the expansion takes place in one stage, as in turbines with a single wheel, the velocity of flow reaches a value usually above 3600 feet per second. But to obtain the maximum efficiency the moving part of the machine should have a relative velocity approximately half that of the steam. As it is practically impossible to construct turbine wheels for a peripheral velocity above 1200 feet per second, the efficiency with a single wheel is necessarily low, due chiefly to the necessity of using diverging inlet nozzles in which occur losses by friction and eddying. Angular velocities which correspond to these peripheral speeds prevent direct driving, and render necessary reduction gears, which are subject to excessive wear and accidental breakage.

These circumstances have led to dividing the expansion of the steam into successive stages by producing turbines with multiple wheels, which are a series of simple turbines mounted upon the same shaft and driven successively by the same current of steam. This design of multiple turbines is by no means novel. It will suffice to mention the name of Tournaire, a French mining engineer, whose theoretical description to the Academy of Science in 1853 of a reaction turbine with multiple wheels is surprising when the description is compared with the Parsons turbine brought into use 30 years later.

Every simple turbine may be designed either as an impulse turbine or as a reaction turbine. The fall of pressure under which the simple turbine works takes place solely in the distributor, while in the latter type it takes place also in the moving wheel, so that there is a higher pressure in the guide vanes than at the exit. It is possible to distinguish between an action turbine and a reaction turbine, as in the former type the vanes in transverse section have the form of an arc of a circle with entrance and outlet angles practically the same, while in the reaction turbine they have the form of a parabolic arc, the entrance angle being approximately 90 degrees and the outlet angle between 20 and 30 degrees. Generally the vanes are thicker in the middle, so that the steam spaces between them have approximately a constant transverse section for impulse turbines or decreasing section for reaction turbines. If, however, they are made of plate they may have a constant thickness. In reaction turbines it is important that the increase in thickness should be suitably calculated to avoid a loss of efficiency. In the impulse turbine the efficiency is little affected whether the vanes have a constant or variable thickness. In a turbine with multiple wheels the different simple turbines may be all designed alike or in different ways to produce a hybrid system.

Drum Turbines and Multicellular Turbines.—From another point of view, drum turbines may be distinguished from multicellular turbines; in the former type the moving vanes are fixed upon a cylindrical drum; in the latter they are fixed to the periphery of flat wheels, separated from each other by diaphragms which divide the interior of the turbine into cells. The turbine of the author belongs to the latter type. These two types have different properties, so far as losses of steam are con-

cerned. In the multicellular action turbine leakage of steam can only take place through the play which exists between the shaft and the ring of the fixed diaphragm which surrounds this shaft. In the reaction drum turbine leakage may take place around the moving wheels and between the guide vanes and the moving drum. The first leakage can be suppressed by making the wheels work by impulse instead of by reaction, but then the second leakage between the fixed vanes and the moving wheel attains its maximum. It is because of this leakage at the periphery of the drum that such turbines require most accurate workmanship. It is easy to understand that a play of some tenths of a millimeter is sufficient, at least upon the high pressure side, to produce a cross sectional area of the leakage passages equal to that of the admission passages between the distributing vanes; if by specially exact workmanship the cross section of the leakage passages is made very small, after some years, the wear of the parts, by friction or the action of the steam, will increase their cross section and so cause a noticeable decrease in the efficiency of the machine.

In multicellular turbines the leakage, being confined to the periphery of the shaft, is reduced in proportion to the radii of the shaft and the drum; and, moreover, friction being less to be feared at a place where the relative velocities are smaller, the play may be reduced to the minimum. In practice we do not give this play any precise value, but build the machine with practically no play round the shaft, and when started it wears its own play.

Friction of the Moving Parts on the Steam.—It would appear probable that multicellular turbines produce relatively large losses by friction of the moving parts upon the steam owing to the large surface of the moving wheels. This is, however, not the case. From tests we have found that frictional losses represent only from 2 to 4 per cent. of the normal power developed by the machine. These figures apply to turbines with an output exceeding 500 horse-power, and are comparable with those obtained in drum turbines in which the friction of the moving vanes themselves must be added to that of the cylindrical surface of the drum.

Turbines with Groups of Wheels.—Another type of turbine belonging to the impulse class is the Curtis. In this the velocity of the steam is used upon several wheels in series to diminish it gradually.

The type having a group of wheels possesses the advantage of allowing a great reduction in the speed of rotation, and would be preferred to all others if it had not, in our opinion, the grave defect of preventing a sufficiently high efficiency being attained. Owing to the great velocity of flow of the steam in the first wheels the losses of energy by friction and eddying are very great, such that each wheel develops less power than its predecessor, and when more than two are used they act like brakes rather than prime movers. The Curtis turbine, as originally constructed at the Fish Station in Chicago, had groups of four wheels, but the process of evolution reduced these to groups of three and then to groups of two wheels. Even with such a reduction in the number of wheels in a group the efficiency, according to our calculation, is still at least 20 per cent. lower than that obtainable with the multicellular turbine which has only one wheel per cell.

***Description of the Rateau Turbine.**—A very interesting characteristic of the multicellular type of action turbines is the possibility which it allows of leaving considerable play between the fixed parts and the moving parts, which greatly facilitates construction and obviates the chances of dangerous friction if the bearings should become worn or the shaft somewhat bent. Besides this the wheels revolve in a chamber where the pressure is uniform. There is for that reason an absence of longitudinal thrust upon the moving parts and no necessity for dash pots or balancing pistons as in reaction or drum turbines. Finally, in the action type partial injection of steam is possible—that is to say, the steam may be directed upon a limited portion of the circumference. In the first diaphragm which the steam passes through the dis-

* Abstract of a paper presented by Prof. A. Rateau before the Institution of Mechanical Engineers and the American Society of Mechanical Engineers, at Chicago, June 1, 1904.

* This has been considerably abbreviated, owing to the extended description of the Rateau turbine as given in *The Iron Age* of May 28.

tributing vanes are placed only upon a part of the circumference. Thus the velocity of the steam is better utilized. To produce the same effect the useful part of each distributor is set with an angular advance on the preceding section, calculated according to the speed of rotation, so that the steam leaving one moving wheel enters into the following distributor and never encounters a solid wall, which would produce a shock and therefore a loss of kinetic energy. For the last wheels it is necessary to employ total injection—that is to say, the distributing vanes must be set upon the whole circumference of the diaphragm, and, moreover, owing to the expansion of the steam, the radius must be increased. The bearings of these turbines are external, and by means of a special system of spring packing they are kept perfectly tight. The speed of rotation is controlled by a centrifugal governor with a Denis compensator, which acts upon an obturator which controls the pressure of steam entering the turbine.

Mixed Turbines.—In the case of installations where exhaust steam must be used it is often desirable to supply the turbines temporarily with steam at high pressure when the primary machine is stopped or is furnishing less steam, and the work done by the turbine must remain the same. In order to obtain economical working it is preferable not to expand this steam in order to lower it to the pressure for which the low pressure turbine is built. The author has designed a turbine which can be supplied either simultaneously or separately by steam at high and at low pressure without lowering the efficiency of the mechanism. To attain this result the turbine is in two parts, one for high pressure and the other for low pressure steam. The steam at high pressure having done work in the first part will pass to the second part, which may be fed also by steam coming from the accumulator. The admission of high pressure steam into the first part is automatically obtained by a special regulator which allows steam from the boilers to pass to the first part when the pressure in the accumulator falls below a certain value. This arrangement, which has been adopted in all the new applications of the system to the use of exhaust steam, works economically, and is particularly suited to cases in which the primary machine works irregularly and where the demand for live steam is frequent and somewhat prolonged. In the small machines the two parts are usually joined together.

Efficiency of Turbines.—The author uses the expression "Theoretical consumption of the perfect machine" to denote the maximum work which the steam is capable of supplying when starting from the saturated or superheated condition and expanding adiabatically with no loss from admission pressure P to exhaust pressure p . By comparing the actual consumption of steam as measured during the tests of the machine with this theoretical consumption of the perfect machine for identical conditions of pressure and similar states of the steam the net efficiency of the machine is obtained. The author has derived the following empirical formula for use when the steam is saturated and dry at admission:

$$K = 0.85 + \frac{6.95 - 0.92 \log P}{\log P - \log p}$$

This formula gives the consumption K in kilograms per horse-power hour of 75 km. as a function of the absolute pressures P and p expressed in kilograms per square centimeter. In British measures this formula becomes

$$K = 2.13 + \frac{16.20 - 2.05 \log P}{\log P - \log p}$$

K in pounds per horse-power hour, P and p in pounds per square inch. If the steam admitted to the turbines is superheated, then in estimating the theoretical consumption the extra calorific energy corresponding to the superheat must be taken into account; but for the exact estimation of this extra energy we have not as yet adequate precise knowledge of the specific heat of the vapor of water. The figure obtained by Regnault, 0.48, is merely a rough approximation. The author has begun some experiments from which he believes he will be able to prove that the true specific heat of steam is not constant, as has been usually supposed up to the present, but varies inversely as the amount of superheat, and is probably ap-

proximately unity for very small values of superheat, and approaches 0.40 for large amounts of superheat.

Calculation of the Efficiency of Turbines.—The efficiency of a turbine may be calculated when a preliminary study has been made of the practical coefficients which must be introduced into the theoretical formula. We calculate this efficiency with quite a remarkable degree of accuracy by dividing the losses of the machine under two headings—the internal losses produced by friction and eddying of the steam in the fixed and moving vanes, and the external losses, the leakages of steam in the play between the fixed and moving parts, and to the friction of the wheels upon the steam and to the friction of the bearings. The first losses give rise to the internal efficiency, which may be called the "hydraulic efficiency," by extending the use of the term employed for hydraulic turbines. This internal efficiency depends upon the more or less perfect form of the vanes and the relation between the peripheral speed of the moving vanes and the speed of flow of the steam. It is possible to draw a curve showing the efficiency as a function of the peripheral velocity, and therefore it is easy to at once assign the degree of efficiency which a given turbine will realize.

Once having fixed the internal efficiency to obtain the net efficiency, deduct the losses by leakage as well as the losses by friction of the wheels upon the steam, and also those in the bearings. Take, for example, a multicellular turbine of 1500 brake horse-power upon the shaft with a speed of 1500 revolutions per minute. By means of practical coefficients found by experience we can calculate that the internal efficiency of such a machine may easily rise to 69 per cent.; on the other hand, the losses by leakage and by friction in the bearings absorb 1.5 per cent. of the normal power, and the losses due to friction of the wheels upon the steam amount to 2.5 per cent., making a total for the external losses of 4 per cent. The net efficiency upon the shaft at the speed stated will then be 0.69 multiplied by $0.76 = 0.66$. From this value of efficiency it is easy to calculate the consumption of steam per horse-power hour which would be required by this turbine under conditions of pressure and of superheat of the steam already determined. All calculations for designs of turbines that we have made by this means have proved correct within 1 to 2 per cent. of actual practice. Such accurate calculations are not possible in the case of reciprocating engines, owing to the action of the cylinder walls, which makes calculations uncertain and often inaccurate, while in the turbine the continuity of flow of the steam allows practical calculations of a high degree of accuracy to be based upon theory once having determined the fundamental coefficients which are employed in the formulae.

The Results of Actual Practice.—The author began the construction of his first multicellular turbines in the year 1898 in collaboration with the firm of Messrs. Sautter-Harlé of Paris, and there are now already at work or in process of manufacture turbines developing more than 25,000 horse-power in units varying from 10 to 2000 horse-power irrespective of the designs now in preparation. Some of these turbines are used for driving dynamos, others for pumps, for fans and for the propulsion of vessels.

Turbo-Dynamos for Direct Current.—The company of the mines of Peñarroya in Spain installed in their central electric lighting station a little more than a year ago three groups of turbo-dynamos developing 500 electric horse-power with direct current at 240 volts. Each of these sets comprises two turbines for high and low pressure, and two dynamos for direct current, the latter directly driven from the turbines upon the same shaft and upon the same bed plate. The two dynamos supply a three-wire net work with a potential of 480 volts between the outer wires. The speed is about 2200 revolutions per minute, and the floor space occupied only 12×5 feet 6 inches, with a height of 5 feet. The condensation of the steam is effected by ejector condensers of a type designed by the author. The turbine has 24 moving wheels.

The works tests of the first group gave the results shown in the following table:

Table I.

Data.	¼ load.	½ load.	Full load.	Over-load.	Over-load at 2,400 revs.
Electrical horse-power at brushes.....	135	250	525	627	641
Admission pressure, absolute, pounds per square inch.....	46.21	76.6	136	156	156
Exhaust pressure, absolute, pounds per square inch.....	1.24	1.33	1.63	1.82	1.82
Theoretical steam consumption of perfect engine per horse-power hour, pounds.	10.93	9.8	8.89	8.73	8.73
Actual steam consumption per electrical horse-power hour at brushes, pounds....	21.3	18	15.8	15.39	14.90
Combined efficiency of the electrical generating set.....	0.513	0.540	0.560	0.569	0.580

The condensation was made for these tests by a surface condenser, so that the water of condensation might be collected and measured. It will be seen that the vacuum at the condenser declined as the power increased. This result arises from the fact that the condenser being designed for machines of 250 horse-power was of insufficient size for the larger volumes of steam.

It follows from the preceding figures that a turbine developing 644 electric horse-power and working without appreciable superheat between an admission pressure of 156 pounds absolute and an exhaust pressure of 1.8 pounds (notably higher than the results given by good condensers in practice) has given the reduced consumption of 14.9 pounds per electrical horse-power at the terminals, the combined efficiency for the set being then 59 per cent. when compared with the energy contained in the steam for the same fall of pressure. With steam at 180 pounds superheated 50 degrees and a vacuum of 29 inches of mercury, the consumption at 2400 revolutions per minute would decrease to 11.5 pounds per electrical horse-power hour.

Turbines with Alternators.—The construction of generators for two-phase and three-phase current for direct driving by turbines offers much less difficulty than the design of direct current dynamos for the same purpose, as the absence of the commutator renders possible higher angular velocities. Three types of alternators have been tried—with solid rotors, with rotating field magnets and with rotating armatures. The first type would be, from a mechanical point of view, the ideal generator for coupling to a steam turbine, for it would permit of making the movable part of very solid construction which is easy to balance. Unfortunately from its design, it is impossible to use speeds higher than 1500 revolutions per minute for a frequency of 50 periods per second, and it permits much greater magnetic leakage than the others, which necessitates disproportionately large dimensions and a comparatively low efficiency. Alternators with revolving field magnets or revolving armature have been built in great number. A turbo-alternator with revolving field magnets developing 400 electric horse-power at 5500 volts is now working in the generating station of the Loire Electricity Company. The moving part of this machine makes 3000 revolutions per minute. The results of tests have been as follows:

Pressure of steam.....170 pounds absolute.
Back pressure of the exhaust.....2.85 pounds.
Output of the terminals.....388 electric horse-power.
Consumption of steam per electrical horse-power, including excitation.....19.2 pounds.
Combined efficiency.....48.7 per cent.

The efficiency obtained could have been much improved by increasing to a slight extent the dimensions of the turbine, which had only 12 moving wheels, but even now it is comparable with turbine sets of the same power of other types. Three similar sets working with superheated steam are now being constructed for the factories of Pavin de Lafarge at Teil (Ardèche). The results guaranteed by the makers are as follows:

Pressure of steam on admission to the turbine.....156 pounds.
Vacuum in the condenser.....26 inches.
Temperature of the steam.....270 degrees C.
Consumption of steam per electrical horse-power at the terminals, including excitation.....15 pounds.

All these different machines are fitted with ejector condensers.

A machine of 2000 kw. at 1500 revolutions per minute would have a turbine efficiency of 68 per cent., which would enable the following guarantee to be given, assuming the use of superheated steam and the condenser giving a very good vacuum, which it is easy to obtain with steam turbines in which there is no entrance for the air: Pressure of steam on admission to the turbine.....200 pounds.
Vacuum in the condenser.....29 inches.
Temperature of the steam.....350 degrees
Consumption of steam per horse-power hour upon the shaft of the turbine.....8.5 pounds.

Turbines for Vessels.—The author read a paper on March 25 last in London before the meeting of the Institution of Naval Architects upon the application of steam turbines to the propulsion of vessels.*

Turbine Driven Pumps.—The application of steam turbines for the direct driving of centrifugal pumps enables remarkable results to be obtained and renders possible heights of lift greater than those which are at present obtained. It is well known that the pressure produced by the wheel of a centrifugal pump increases directly as the square of the peripheral speed, and therefore with the velocity produced by steam turbines it becomes possible with a single wheel to raise large volumes of water to heights of more than 900 feet in a single lift. If it is desired to obtain greater pressures or to obtain the same results with relatively lower speeds pumps may be used consisting of several similar wheels arranged in series so that each one increases by an equal quantity the pressure already given by the preceding wheels. By combining the advantage of high velocities of rotation with the advantage obtained by putting the wheels in series it would be quite easy to deliver to heights greater than 1500 feet. The author has designed a type of multicellular centrifugal pumps upon the general ideas set forth in the "Treatise on Turbine Machines," which appeared in 1900, in which the author showed their application to hydraulic turbines, pumps and centrifugal fans. Multicellular turbine pumps form very light sets, which are compact and extremely simple. Their maintenance is very low, for the wear is almost nil and the cost of lubricating oil extremely small. In the examples referred to below it will be seen that the consumptions of steam per brake horse-power in water raised are comparable with those of good piston pumps.

Turbine Driven Pump at Falkenau (Bohemia).—The first machine of this kind consisted of a single bed plate upon which were mounted a steam turbine with multiple wheels inclosed in the same casing, and a pump with four wheels also mounted in a single case. The regulation of speed was obtained by a centrifugal governor arranged in the base of the principal bearing. The lubrication of the end bearing of the shaft on the pump side was effected by means of a little hydraulic Servo motor. A compensating piston enabled the longitudinal thrust received by the moving part of the pump to be exactly counterbalanced. This thrust is moreover inconsiderable owing to the special arrangement adopted for the wheels of the pump. Condensation of the steam was effected by means of an ejector condenser. The results obtained in the different tests of this set were as follows:

Table II.

Admission pressure of steam P, pounds per square inch.....	82.5	91.9	94.6	97.5	104
Exhaust pressure of steam p (vacuum 24.8 inches of mercury), pounds per square inch.....	2.47	2.47	2.47	2.47	2.47
Revolutions per minute.....	3,175	3,200	3,200	3,200	3,280
Total height raised, feet.....	721	721	695	669	688
Discharge of water, gallons per minute.....	405	492	551	608	665
Useful work in water raised, horse-power.....	89	107.8	116.7	123.6	139.4
Theoretical consumption of steam per horse-power hour, pounds.....	11	10.7	10.62	10.5	10
Actual consumption of steam per useful horse-power of water raised, pounds.....	34.61	32.15	30.3	29.5	27.8
Total combined efficiency of the turbine pump....	0.315	0.335	0.350	0.355	0.369

* An abstract of this paper was given in connection with the article on the Rateau turbine in *The Iron Age* of May 26.

It appears from these figures that it is possible with such a turbine driven pump to obtain combined efficiencies of 36.5 per cent., which corresponds to an efficiency for the pump of 67 per cent., and an efficiency for the turbine of 55 per cent.

Turbo-Driven Pumps at Bruay.—A more powerful turbo pump has been made and delivered recently to the Mining Company of Bruay, in the Pas-de-Calais. This set can raise 950 gallons a minute to a height of 1200 feet. The complete set is mounted above a small tank, into which discharges the ejector condenser, used for condensing steam, and from which is taken the suction of the principal pump. At the end of the shaft is a small pump directly coupled to the turbine and furnishing water to the ejector condenser at a pressure equivalent to a head of 18 to 20 feet. The results obtained with this pump at full load were as follows:

Discharge in gallons per minute.....980 gallons.
Total lift.....1,195 feet.
Revolutions per minute.....2,200
Absolute pressure of the steam on admission to the turbine.....101 pounds.
Absolute back pressure at the exhaust.....1.61 pounds.
Brake horse-power of the set.....359 B. H. P.
Consumption of steam per brake horse-power hour in water raised.....22.7 pounds.
Total net efficiency.....42.5 per cent.

It will be observed that the total efficiency is very high, attaining 42.5 per cent. One of the chief advantages of turbo pumps, besides their excellent efficiency, is the extremely small floor space which they occupy when compared with piston pumps. Their dimensions are very small, and they require very little height, so that they can be placed in a room which has no greater dimensions than that of an ordinary working gallery in a pit.

Turbo Pumps for Boiler Feed Purposes.—This class of pumps can be used for feeding steam boilers, and when there is a group of generators of the same size one pump can easily provide the whole service with a consumption of steam much less than that of the small feed pumps usually employed. While ordinary reciprocating pumps consume from 150 to 250 pounds of steam per brake horse-power in water moved, the turbo pumps will usually require not more than 40 to 60 pounds per brake horse-power. An automatic system of control has been designed by the author which enables the apparatus to work automatically in a continuous manner even when the demand falls to zero.

Turbo Pumps of Large Output for Raising Water in Towns.—Turbo pumps, both from the point of view of efficiency and also of ease in working, are particularly suitable for raising water into reservoirs for the service of towns. The following figures indicate results which have been obtained with this class of machine in similar conditions to those that exist in large towns:

Delivery in gallons per minute.....5,200
Height to which the water is raised.....460 feet.
Actual horse-power in water raised.....730 B. H. P.
Combined efficiency, including condensation.....46 per cent.
Pressure of steam in pounds per square inch.....210
Vacuum at the exhaust.....28 inches.
Superheat in the steam.....100 degrees.
Consumption of steam per brake horse-power hour in water raised.....15 pounds.

Turbo Fans.—The great angular velocity of steam turbines makes them particularly suitable for the direct driving of fans for high pressure used for blowing engines and even for air compressors. With an angular velocity of 20,200 revolutions per minute this fan discharged 22.5 cubic feet of air per second under a pressure of 19 feet of water. The useful work contained in this compressed air was about 41 horse-power, and the combined efficiency of the group 30.7 per cent. The pressure of the steam on admission to the turbine was 145 pounds per square inch. A special system of regulation enables the pressure of discharge to be kept constant whatever may be the volume of discharge, and on the contrary to maintain a constant discharge whatever may be the pressure. A set at work in the forges of Chatillon et Commeny is used for blowing a blast furnace, and consists of two fans arranged in parallel, each being driven by one turbine (the two turbines are placed in series). The apparatus will discharge 80 cubic feet of air per second under a pressure of 10 inches of mercury. The energy

in the compressed air rises as high as 100 horse-power. The moving wheels of the fans and of the turbines are only 11.2 inches in diameter. Table III. gives an abstract of the results of trials to which the apparatus was submitted.

Table III.—Turbo Fans.

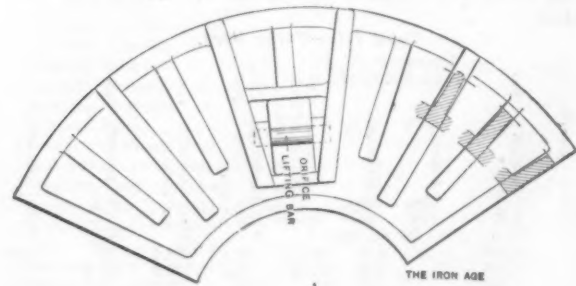
Orifice, Sq. in.	per Revolutions minute.	Pressure of steam absolute.		Air pressure at discharge of fan, Feet of water.	Cu- bic feet per second.	the Horse-power, oretical.	Horse-power, use- ful.	Total efficiency.
		Admission. Lbs. per sq. in.	Exhaust. Lbs. per sq. in.					
19.1	15,200	113.8	4.53	10.60	91.4	260.4	99	0.380
	15,700	128	4.80	11.61	93.5	299.5	112.6	0.377
	14,600	113.8	4.92	9	99	256.9	93.2	0.363
22.3	15,200	128	5.32	9.90	103	289.6	106.52	0.368
	15,800	142.2	5.68	11	107.5	327.2	121.91	0.372
27.8	14,300	113.8	4.44	7.55	114	261.8	91.08	0.348
	14,900	128	4.80	8.25	117.5	299.5	102.46	0.342

One important characteristic of these sets is their remarkably small dimensions, and they can be put down at an expense which is very small in comparison to large piston blowing engines. By coupling several wheels of centrifugal fans, as we couple the wheels of multicellular pumps, much higher pressures of air can be obtained. In a few months we shall finish the construction of a centrifugal turbine compressor of 350 horse-power, capable of delivering compressed air at a pressure of 90 pounds per square inch. This will be driven by a low pressure turbine using exhaust steam from a winding engine used in a pit. The turbine has as a stand-by a high pressure turbine to insure economical working during the time when the winding engine is out of use. This special branch of the application of steam turbines to air compression has, in our opinion, a great future, not only for work in mines, but also in metallurgy, where blowing engines of all kinds for blast furnaces and for the tuyeres of steel works may be replaced by the centrifugal machines of a much simpler and smaller character, costing far less and requiring less repairs than the present piston engines.

Turbines for Low Pressure with Steam Accumulators.

—One of the most promising applications of steam turbines is the use of steam at low pressure, and particularly exhaust steam coming from engines working intermittently. These are usually employed in installations for the working of minerals or for rolling mills and pile drivers, and have not until recently been able to benefit by the advantages available to engines working continuously, owing to difficulties in the application of condensing plant, multiple expansion and superheating to such engines. The majority therefore discharge the exhaust freely into the air, and the quantity of steam thus lost is considerable. The author has employed such waste steam satisfactorily by means of his regenerative accumulator of steam, combined with turbines at low pressure, which are themselves coupled directly to dynamos, centrifugal pumps, or fans. The regenerative accumulator regulates the intermittent flow of steam before it passes to the turbine, and consists essentially of a vessel containing solid and liquid materials, which play the part of a fly wheel for heat. The steam collects and is condensed as it arrives in large quantities in the apparatus, and is again vaporized during the time when the exhaust of the principal engine diminishes or ceases. The necessary variations for condensation and regeneration of the steam correspond to fluctuations in pressure in the accumulator, this pressure rising when the apparatus is being filled and descending when it is discharging into the turbine. Water having a very high calorific capacity has been used as a heat fly wheel, but in order to rapidly communicate to a liquid mass a considerable quantity of heat corresponding to the latent heat of steam to be condensed it becomes necessary, owing to the poor conductivity of water, either to arrange it in thin layers or to cause a rapid circulation to increase the surface of contact between the steam and the water. The first solution of the problem was an accumulator with flat cast iron trays containing water arranged one above the other. Fig. 1. The second solution was an accumulator with water only, in which a rapid circulation was produced by the injection of steam into the body of the liquid itself,

Fig. 2. The low pressure turbine, fed by the regular flow which comes from the accumulator, and working, for example, between an admission pressure of 15 pounds per



Plan of One-third of a Basin.

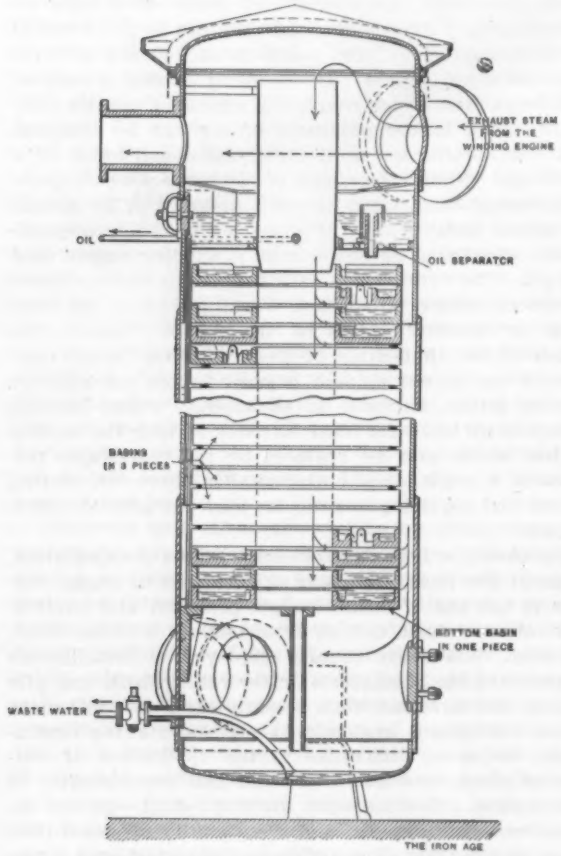


Fig. 1.—Regenerative Accumulator.

square inch and a vacuum at the condenser of 27 inches of mercury (back pressure of 1.6 pounds), can furnish an electric horse-power for about 31 pounds of steam per hour. In a moderate sized pit, consuming 13,000 pounds of steam per hour, it is therefore possible to economize under these conditions about 350 electric horse-power. In steel works, where reversible steam rolls are employed consuming about 45,000 pounds of steam per hour, it will be easy to develop, by means of accumulators and turbines, an extra output of over 1100 electric horse-power. It is desirable to mention that the prime movers are in no way injuriously affected in their working by the presence of the accumulator and turbines. This method was applied for the first time at Bruay, and the installation has worked most satisfactorily since August, 1902, when it was first put into use. The exhaust steam from a winding engine is first of all treated by an accumulator with cast iron trays, and then passes to a low pressure turbine of 300 horse-power, which itself drives two dynamos keyed upon the same shaft. A particular feature of this type of installation is the "Automatic Expander," which comes into use when the winding engine is not giving sufficient steam, and also when this engine is not working. The apparatus admits live steam to the turbine, which is passed from the boilers through reducing valves. This expander can be adjusted by means of a spring, and comes into use as soon as the pressure falls below a predetermined point.

Table IV. gives the results of tests made upon this set.

This system of regulation by means of steam accumulators and turbines, which is particularly applicable to mines and steel works, enables very considerable economy to be effected.

Conclusion.—There is no need to insist upon the well-known advantage in turbines resulting from their absolutely steady rotation, but, on the contrary, the enormous speed at which they must work in order to suit the velocity of flow of the steam is, in many cases, a serious inconvenience, particularly in the application of the turbine to the propulsion of vessels. It was a similar disadvantage for a considerable time in the driving of dynamos, but now it is possible to construct dynamos for very high speeds, and these can be coupled to steam turbines, forming light and inexpensive sets which take up little room, although they are very powerful. Such sets are very simple and are very easy of maintenance. Besides the constant value of the turning effort they have the advantage of very low consumption of steam, particularly at small loads, hence are superior to piston engines of even the best known types. Further advantages are the small floor space occupied, the absence of expensive foundation work and the low cost of lubricating. The oil in the reservoirs need be changed only once in two

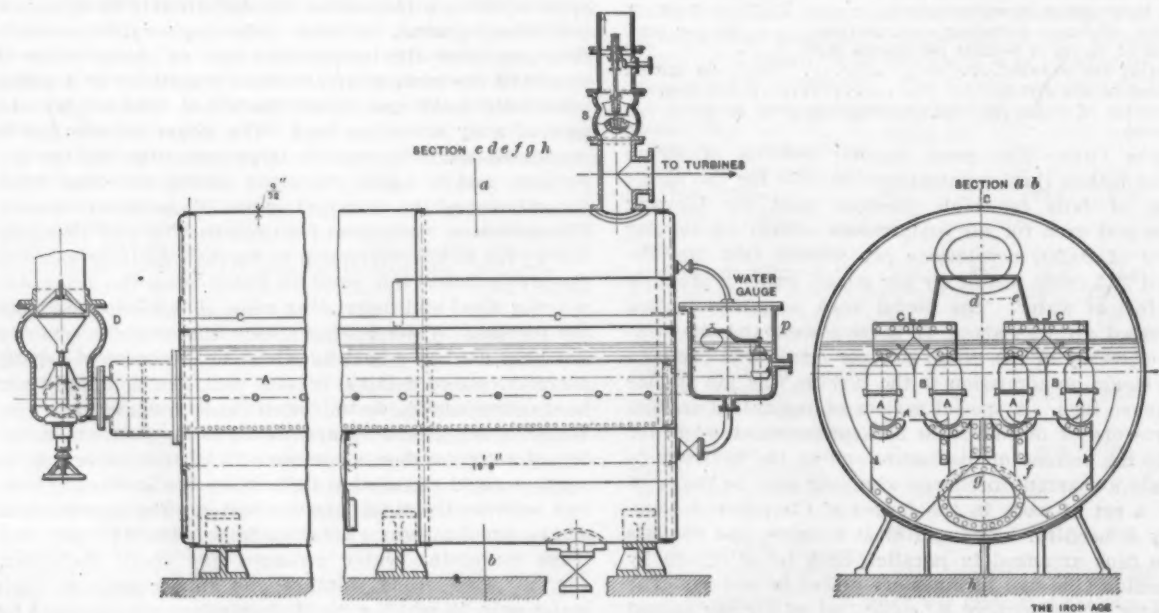


Fig. 2.—Water Heat Accumulator.

months, and it is not thrown out by the rotating parts, so that the machinery always remains clean. Momentary or even permanent overloads are very easy to deal with. It is even quite possible to have overloads of more than 50 per cent. The regulation of speed in steam turbines is carried out in a more perfect manner than is possible for piston engines, due to the absolute constancy of the turning effort and the great kinetic energy accumulated in the revolving parts. This last characteristic makes the machines very insensible to variations in load. The

The Chicago Machinists' Strike.

The machinists' unions in Chicago are met by the employers in their solid organization, the Metal Trades Association, in which all employing machinists work together for the good of the general cause and for the protection of such firms as have been singled out by the unions as their point of attack.

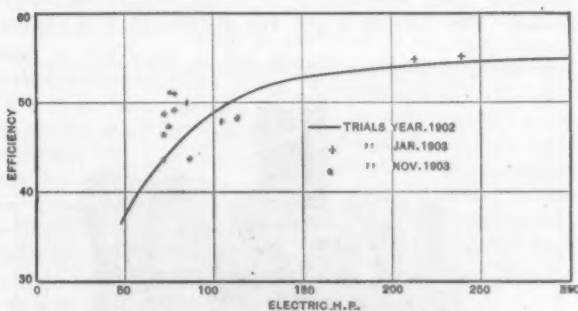
Prior to the expiration, on May 1, of the previous annual contract with the International Association of Ma-

Table IV.—Experiments with the Low Pressure Turbine and Dynamo of 300 Horse-Power for the Bruay Collieries.

Revolutions per minute.	Kilowatts at the Terminals.	—Absolute pressures.—		Temperature of steam. ° Fahr.	Flow of steam measured. Cubic feet per hour.	Consumption of steam per horse-power-hour.		Efficiency. p. %
		Steam to turbine. Pounds per square inch.	Condenser. Pounds per square inch.			Measured. K. Pounds.	Theoretical. K. Pounds.	
1,337	169.5	12.02	2.13	269.6	165	45.2	21.9	0.485
1,500	176.5	12.02	2.22	269.6		42.8	22.2	0.513
1,610	186	12.02	2.22	269.6		40.6	22.2	0.547
1,690	190.5	12.02	2.22	269.6		39.7	22.2	0.559
1,840	198	12.02	2.22	271.4		38.1	22.2	0.581
1,510	225	14.37	2.49	275		41	21.2	0.516
1,605	232.5	14.37	2.52	275	201	39.8	21.3	0.534
1,700	240.5	14.37	2.57	275		38.5	21.5	0.559
1,800	247	14.37	2.62	275		37.4	21.7	0.580
1,589	203	5.42	1.25	231.8	79	51.1	25.1	0.492
1,600	140.9	9.37	1.82	275	130	42.1	22.3	0.530
1,591	202	12.83	2.32	278.6	177	39.7	21.1	0.531
1,598	232.5	14.70	2.79	296.6	203	39.5	21.9	0.556

* The efficiency is the relation between the electric power measured at the terminals of the dynamo and the theoretical energy contained in the current of steam utilized for such conditions of pressure; this yield is therefore stated after the deduction of all losses in the turbine and in the dynamo.

full load may be taken off and put on again without causing a variation in speed of more than 2 to 3 per cent. When coupled to dynamos, fans or centrifugal pumps, steam turbines render it possible to obtain surprising results, owing to their capability of giving great power at very high speeds. The author has constructed turbine driven fans, giving a pressure of 7.5 pounds per square inch, and turbine driven pumps raising water to several



Comparison of Efficiencies, 1902 and 1903.

hundreds of meters. Such sets can now be built to develop several thousand horse-power, compressing air to more than 90 pounds per square inch, or raising water to more than 2000 feet high. Turbines are able to use to perfect advantage steam at low pressure, for they have an efficiency rising in value as the pressure of the steam becomes lower. In combination with steam accumulators turbines permit of the employment of exhaust steam in large quantities produced by engines working intermittently, such as winding engines and engines used in metallurgical works.

An oxy-acetylene blow pipe described by M. Fouché in the *Bulletin* of the French Physical Society has the flame formed by the combustion of a mixture of one part of acetylene to one-eighth of oxygen, and in order that the explosion may not travel back into the blow pipe a jet velocity is required equal to that produced by the pressure of a water column 13 feet high. The flame melts most metals readily, and it will solder iron and steel. Even silica and lime are melted by it. With a reduction of the proportion of oxygen the flame becomes luminous, and on falling on lime the free carbon goes to form carbide of lime.

chinists, steps were taken on both sides to formulate a new contract of advantage to each side. The original demand of the Metal Trades Association was a horizontal decrease in wages of 10 per cent. or the elimination of the minimum wage. In answer to this, the unions, after a referendum vote, instead of accepting the decrease, demanded an increase from 30 cents an hour to 33 cents an hour as the minimum wage for machinists, and from 35 cents an hour to 37½ cents an hour for die and tool makers, and a reduction of hours from 54 to 50 hours per week, to be brought about by closing the shops at noon Saturdays. The Metal Trades Association met this proposition with another, in which they agreed to pay last year's wages, in spite of the depression in the machinists' business, but in which they insisted that men doing roughing out and other unskilled work should not be classed as machinists. In the final discussion this was the vital point, as the machinists agreed to waive their demand for advanced pay and decreased hours, but refused to accede to the proposition that the men doing roughing out should not receive machinists' pay. Employers state that Chicago machine shops are placed at a great disadvantage compared with neighboring shops, because in Chicago alone employers are compelled to pay machinists' wages to men doing roughing out work, and the result is that roughing out can no longer be done in Chicago on a competitive basis.

Inasmuch as the International Association of Machinists has already on hand the extensive strike in the shops of the Santa Fé road and a number of other strikes in other parts of the country, their financial ability to support striking machinists is somewhat curtailed. For this reason their plan of campaign in Chicago was to center their attack on one or two firms at the start, as indicated in our last week's issue, with a view to making the attacked firm surrender to their demands, and then taking up another series of shops, thus keeping a maximum number of men employed and drawing wages, so that they could be called upon for assessments to support idle men. This method on the part of the unions was outflanked by the Metal Trades Association, who immediately took steps to distribute unfinished work from the shops of the Goss Printing Company and the Charles F. Elmes Engineering Works, in which the first strikes were called, to other shops, with the expectation that as soon as the contraband work should reach the other shops the men would go out in those shops. The work from the two firms named was distributed to the shops of the Foster-Kimball Company and the Link-Belt Machinery Company, and resulted, as had been expected on the part of the Metal Trades Association, in a walkout of the men in

these shops. In turn, the unfinished work in these shops was distributed to Greenlee Brothers, the John Davis Company and the Illinois Foundry & Machine Company, and by the rules of the union the men in these shops were also compelled to lay down their tools and quit work.

The process of distributing work in shops deserted by strikers continued, and last Saturday morning men were forced by their own rules to leave the shops of Barnhardt Brothers & Spindler and the Sullivan Machinery Company. In this way, while the Metal Trades Association has in no case inaugurated a lockout, and has studiously refrained from anything that would appear as a lockout, they have taken the initiative in compelling a strike in nine of the leading machine shops of Chicago, and this process will go on, if necessary, until all the shops in the city are closed. Meanwhile, steps are being taken by the association to employ nonunion machinists wherever they can be obtained, and to hold them in readiness until such time as their services are required. The purpose of the association is to settle, once for all, the matter whether their shops shall be controlled by the unions or by the owners, and they confidently look forward to a victory which will result in an open shop in Chicago in all machine trades, just as the employing brass workers have succeeded in completely defeating and disrupting unions which had made life a burden to them for some years.

While negotiations were pending, and before a strike was declared in the Goss Printing Company's plant, John D. Hibbard, president of the Metal Trades Association, issued a letter to the International Association of Machinists, asking that the matter be submitted to arbitration, but this letter was never replied to by the machinists' unions. Mr. Hibbard also made a statement to the public on behalf of the Metal Trades' Association, from which the following extracts are taken:

Regardless of the outcome of the present difficulties, or our apparent failure to operate under agreement successfully more than a single year, the premises upon which we based our efforts I still maintain are true:

1. Unions are a natural result of modern economic conditions and are here to stay, for a time at least, and longer than any one can predict; possibly until the tendency toward other forms of absolute control is also met.

2. Employers' associations cannot destroy unions.

3. No progress has been made toward the ultimate solution of the problem by any purely fighting associations. Citizens' alliances and employers' associations have afforded effective relief and have corrected many abuses, but they have not disposed of the union or the question or relations between employer and employee.

4. Fair agreements, based upon accurate data, honest relations and varying conditions and arbitration (with all its present limitations) where necessary suggest far more rational solutions than strikes and lockouts, intimidation and injunction, with their attendant cost, hardship and engendered hatred. . . .

Carrying our ideas to their legitimate conclusion, we have offered and still suggest arbitration to avoid a costly and bitter struggle. The failure, however, of the union to meet our expectation does not in any degree alter the truth of our original premises, and sooner or later both sides will, I believe, come to recognize their force. Though far from perfect, as now conceived, the agreement undoubtedly is to play a most important part in the final adjustment between employer and employee.

On May 29 six large piers of the Delaware, Lackawanna & Western Railroad, in their Jersey City freight yards, were destroyed by fire, entailing a loss of about \$1,000,000. According to a statement of Vice-President Loomis, the piers will be rebuilt probably of fire proof material, necessitating the use of a great deal of steel. While the fire has inconvenienced the company to some extent, they have made other arrangements, and are forwarding and receiving freight as usual.

Dartmouth College has created the Amos Tuck School of Administration and Finance, Edward Tuck having made two gifts aggregating \$400,000 as a memorial to his father. The building will be completed soon and the first year will begin in September. Dr. William J. Tucker is the president and H. S. Person the secretary. The course comprises two years, the first year requiring for admission three years of college work.

James G. Alexander has resigned his position as manager of Braman, Dow & Co., Worcester, Mass., and will be succeeded by Plummer J. Henderson.

The Taylor-Newbold Metal Cutting Saw.

On May 25 the Tabor Mfg. Company, Philadelphia, Pa., demonstrated in the presence of a number of representatives of the trade press the Taylor-Newbold metal cutting saw, patented by F. W. Taylor and Sidney Newbold, and of which the Tabor company are the exclusive manufacturers. The demonstration was made at the

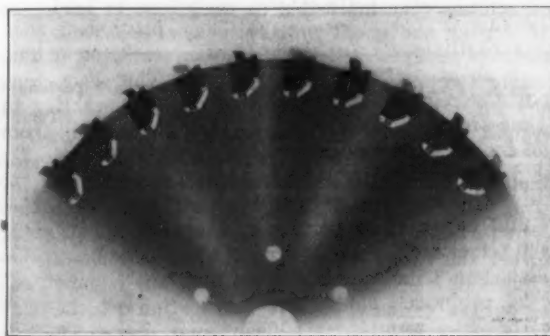


Fig. 1.—A Portion of the Blade, with Tools Inserted.

plant of the Tioga Steel & Iron Company, in the same city.

The saw in operation, and which we illustrate herewith, was 36 inches in diameter and was mounted on a standard Newton cold saw cutting off machine, an estimated motor power equivalent to 10 horse-power being required for the working of the tool. In construction the saw is composed of a steel blade 7-16 inch thick, with 30 inserted teeth, the position, method of setting the teeth or tools, means of adjusting and the tool itself being the important features of the saw. The teeth follow each other at equal distances of about $3\frac{1}{4}$ inches and are set central with the blade of the saw. They are made of air hardening steel, specially treated by the Taylor-White process. The cutting edges are ground in two shapes,

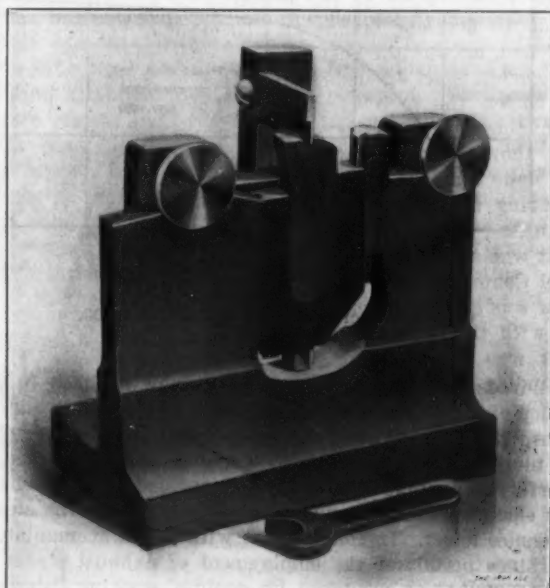


Fig. 2.—The Setting Gauge, Showing a Tool in Its Holder.

one being $\frac{1}{8}$ inch and ground to a flat curve and the other $\frac{1}{2}$ inch wide, ground to a full curve. These alternate in the blade and permit of full cutting power with the least expenditure of energy. These cutting tools or teeth are inserted in a soft steel tool holder, as shown by the engraving, Fig. 2, both the tool and holder being grooved for their entire length on each side, to permit of pouring in a zinc composition metal of low fusing point which acts as a key, holding the tool in rigid position. The edges of the tool holder are grooved corresponding with a tongue on the saw blade, in which the holder is placed and tightened with a taper wedge. At the base of the

holder a set screw is placed, which enables the accurate placing of the holder in the blade and correspondingly governs the height of projection of the tool. A setting gauge, see Fig. 2, furnishes means by which the tool and holder can be accurately set before placing the tool holder in the saw blade. The upper portion of this setting gauge is removable and corresponds to the arc of the saw blade, so that it can be placed in position so as to insure absolute correctness in setting the height of the tool and holder in the blade.

The saw in operation at the Tloga plant had been working continuously for more than a week, on double turn, or about 160 continuous hours. This was done without any regrinding of the cutting tools, operating in that time on steel from 0.25 to 0.45 carbon, ranging from 4 to 15 inches in thickness and advancing from $\frac{1}{2}$ to $1\frac{1}{4}$ inches per minute, with a cutting speed of 90 feet to the minute. The saw was put to work on a steel steering gear link, carbon 0.35 per cent., the section cut being $8\frac{3}{4} \times 14$ inches; cutting through this section was accomplished in 17 minutes, and the final cut made in exactly 20 minutes. No special lubrication of the saw other than the usual soap solution was used. The cut made was absolutely clean and regular, the clearance being ample to prevent binding. On sections $4\frac{1}{2}$ inches in diameter, carbon 0.20 per cent., a complete cut was made in four minutes, this operation being repeated several times and in each case the cut being absolutely clean. The rapidity with which the cutting tools could be removed and replaced was demonstrated, showing that 30 cutters could readily be adjusted to the blade in 45 minutes.

If in any case the cutters should become jammed when working on very heavy forgings one of the wide tools can be removed, thus giving 14 free inches on the blade and enabling the tool to be readily backed out from the cut. In event of wear 50 regrindings of the tool would be permissible, it being estimated that with the grinding tool provided but 1-100 inch would be taken off with each grinding, and after grinding and resetting these tools every cutter would be perfectly true in the blade—a condition which cannot be obtained in ordinary saws, owing to the wear of the grinding wheel between the cut of the first and last tooth. In event of the breaking of a tool, as was the case where a saw was working on 1.88 carbon steel 12 inches thick, taking 4-100 inch feed per cutter, the tool being broken by the work slipping while the saw was advancing 40 inches per hour, it has been shown that the soft steel holder alone is damaged, the blade and the remaining tools being uninjured and requiring the replacing of but one tool and holder to again fit the saw for service.

It was stated by the management of the Tloga Iron & Steel Company's shop that from eight to ten times more work was done with the Taylor-Newbold saw in comparison with the ordinary toothed blade, and that after the work was done there was no necessity of replacing or regrinding the saw. As an illustration, it was said that nine crank shafts, 0.40 carbon, requiring $18\frac{5}{8} \times 5\frac{1}{2}$ inch cuts, had been made with the Taylor-Newbold saw in 80 minutes total machine time, the length of cut being 99 inches, and by reason of the $\frac{1}{2}$ -inch cut taken by this saw they were enabled to save considerable machine work. A 9-inch Taylor-Newbold saw was seen by the writer on the 26th inst., at the plant of the Tabor Company, mounted on a milling machine, and some remarkable speed records were made. The saw in question was 9 inches in diameter, with ten cutters, the thickness of the blade being $\frac{1}{4}$ inch. The cut taken was $\frac{3}{8}$ inch, operating on a piece of $1\frac{3}{4}$ -inch hexagonal steel, of 0.15 carbon, the entire cut being made in 32 seconds. The feed per revolution was 0.117 inch and the revolutions 52 per minute, giving a cutting speed of 127 feet per minute and advancing the tool at the rate of about 6 inches per minute. To show the limitations of this small saw, the cutting speed was raised to 184 feet per minute and the cut made in several seconds less time, the tool being advanced at the rate of $6\frac{1}{2}$ inches per minute. A further advancement of the cutting speed to 231 feet per minute was then made, advancing the tool $8\frac{1}{2}$ inches per minute operating on the same steel, and the cut was made in 23

seconds. All the finished cuts were absolutely clean, the cutter in perfect condition and ready to continue further work at once.

The Tabor Mfg. Company are prepared to furnish these saws in sizes from 4 to 84 inches in diameter, three sets of cutters and holders being furnished with each saw, and as every part is interchangeable, duplicate tools and holders can be furnished whenever desired.

Calibrating the Time Required by Jobs.

The Pratt & Whitney Company, Hartford, Conn., have an interesting and effective system for computing the time required to accomplish a given piece of work. The system is a part of the cost system of the shops and makes use of special blanks of the form shown herewith. As an illustration, assume the problem to be the determination of the time required to produce on an automatic machine a $\frac{1}{2}$ -inch bolt with a 3-inch shank from a piece of 1-inch steel. There will be two cuts required, a heavy roughing cut and a finishing cut, and the head must be formed with a forming tool, the thread cut and the piece cut off.

The revolutions per minute and the feed per revolution are obtained from carefully compiled tables and the figures are placed in their respective columns on the

Y.B.			S.O.	
R.P.S.			R.P.M. CAN GET	191 420
			"-5% SLIP.	180 400
OPERATIONS	OF CUT	FEED PER REV	SEC.	@ SLOW SPINDLE @ FAST SPINDLE
Roughing Cut	3	.0065		461
Finishing Cut	3	.012		250
FORM (ON) roughing cut	25	.0015		(66)
CUT OFF				
TRANSFER				
INDEXING—FEED OUT			12	
REVERSE DIE OR TAP				36 36
TOTAL				497 411
				60 60
				180 29.520 34.660
SECONDS			12	171 61
TOTAL TIME	4 min 41 sec			
EQUIVALENT—9 HRS	132 finished pieces			
DESCRIPTION OF COUNTER				
SPINDLE SPEEDS WANTED FOR—1" DIA @ 50 FT = 191				
1/2" DIA @ 50 FT = 420				

Form of the Special Blank.

blank. The length of cut, 3 inches in this instance, divided by the feed per second, gives the number of revolutions required to do the work, as indicated in the "Slow Spindle" column for the roughing cut and in the "Fast Spindle" column for the finishing cut. The same method determines the number of fast spindle revolutions for the cutting off. As the forming of the head is accomplished simultaneously with the roughing cut it is not considered in the final total of time consumed, but the record may be included in the table by being inclosed in a circle, to indicate its secondary importance, and that it is not to be considered in the determination of the time consumed.

Cutting the thread, 12 to the inch, requires 36 revolutions on each of the slow and fast spindle speeds, and 12 seconds are allowed for indexing, that time being obtained from the table. Adding the figures in the "Slow Spindle" column and omitting the forming operation, the result is 497 revolutions; the total in the "Fast Spindle" column is 411 revolutions. To reduce from revolutions to seconds, it is necessary to multiply by 60 and divide by revolutions per minute, minus 5 per cent., for

slipping. This gives 171 seconds for the slow spindle and 61 seconds for the fast spindle, and adding 12 seconds for indexing, the total is 244 seconds, or 4 minutes and 4 seconds, and the number of finished pieces which could be made in 9 hours is 132.

Western Mesaba Iron Ore Explorations.

What is by far the most important exploratory work in the entire Lake Superior iron ore region has been under way since January 1 by the Canisteo Mining Company of Duluth, and prior to that time by some of their stockholders, in the western part of the Mesaba range.

This company and their predecessors have been drilling for between three and four years in that stretch of country lying west of the developed portion of the Mesaba, west of the range line between ranges 22 and 23, in a region to and beyond the Mississippi River. There is, perhaps, a length of country along the general strike of the Mesaba formation up to 25 miles that has been more or less carefully drilled by this company. Their expenditures have been very large, running up on a number of single 40-acre tracts to from \$15,000 to more than \$30,000 each, but they have shown up an immense tonnage of ore. To the present time this is in excess of 100,000,000 tons of merchantable ore—that is, ore that is either now of shipping quality or that can be made so by inexpensive and simple concentration. Perhaps not half the company's lands have been proved so far, and in much of their work the extent of single ore bodies has not been yet fully defined. More than 200 men are employed and a large number of drills has been constantly at work. This exploration will continue, it is expected, for a long time, and until the lands of the company shall have been quite fully explored.

The ore of all this part of the Mesaba range has suffered in the past, and possibly suffers yet in the estimation of many mining men, under the general accusation of too low grade. Its physical character is peculiar. It is low grade, but the difficulty seems to be an excess of free sand, uncombined, in the ore, and more or less easily removed by mechanical separation. There is no rock in the ore; the deposits are quite large and deep; they are not far from the surface; the phosphorus, generally speaking, is rather low, and the ore is desirable, in that it is hard, free from dust and low in moisture. These ore deposits have been laid down in parallel flat seams of a hard granular hematite, of from a few inches to several feet in thickness, separated by streaks of sand. In some parts of the region this sand is as fine as slimes; in other parts it is coarse and sharp enough for plastering material. Almost everywhere it occurs it is clean and comparatively free from iron.

Experiments were made last year at the Arcturus prospect, in this region, by the Standard Mining Company, of which W. P. Snyder was the head, in concentrating this character of ore, and these were more or less successful, though considerable machinery was used that now appears to have been unnecessary. Had it not been for changed conditions in the iron trade it is probable that the option under which Mr. Snyder had the Arcturus might have been taken up. As things were, the property was abandoned. It has now been taken by the United States Steel Corporation, who are starting drills. The Donora Mining Company, owned by the Union Steel Company of Pittsburgh, also explored some lands in the same region and had an option upon what is known as the Holman prospect, upon which they expended a large sum, but finally abandoned it. It changed hands, and the present owners have since spent more than \$20,000 on the same 40-acre tract and have an ore body that will wash out better than 16,000,000 tons, and of which more than 3,000,000 tons assays above 60 per cent. iron, minerun. This property is now optioned to the Canisteo Company. Ore of the same immediate district in this part of the Mesaba seems to be of nearly the same character, and considerable deposits of quality high enough to mine as it lies have been developed. Of the 100,000,000 tons of concentrates that this company have proved to date, about 25 per cent. is ore merchantable as it lies—

that is, they have shown some 25,000,000 tons of merchantable ore and about 100,000,000 more that will concentrate down, say, 25 per cent.

The Canisteo Company's largest ore bodies have been found in the immediate vicinity of Trout Lake, Itasca County, in sections 20, 30, 31 and 32, T. 56 R. 24. There seems to be a deposit of ore covering parts of these sections that is considerably more than two miles long. It is under a surface of from 90 to 100 feet and varies in thickness to above 200 feet. Pockets of large size are high grade, but the great bulk must be concentrated to reduce the silica in the shape of free sand. Another large group of properties has been found further north and east, in sections 20, 21 and 22, in the same town, and explorations have been carried on still further east with favorable results. These people have found that east of this township, into 56-23, and on to the east until the most western present Mesaba mines are reached, there seems to be a barren district. This, though ore is to be found, is not productive as yet of large deposits. The Cleveland Cliffs Iron Company have a small mine in this latter district, and the Great Northern road has some leases that may be valuable. To the west of 56-24, on beyond the Mississippi River, the Mesaba formation appears to become lost, but there are indications of soft ore all through the country, up to a width from north to south of 18 miles. The Prairie River shows the most westerly outcropping of the Mesaba ore bearing formation, in Section 34, T. 56 R. 25, and no one has yet been able to find any deposits of ore west of that point, or, for that matter, even there. It has been found that these ore bodies carry a higher phosphorus content near their upper and lower strata, the large intermediate portions being quite low.

Concentration of these sandy ores will be attempted by this company on a scale large enough to provide for the output of any mine. It will be by damp agitation in a tilted barrel screen, the final apertures of which shall vary from as fine as 30 to 40 mesh to much coarser, according to the character of the sands. Forty mesh is amply large to permit the escape of all free sand in some of these ores. Not much water will be required, it is thought, though experiments leading to a definite process have not been completed. These are now under way on a considerable scale at the works of the company. There is abundance of water, however much may be needed, as there are two large creeks running over one ore body and one over another, while there will probably be water enough from underground for all purposes. The agitating jigs, &c., used in experiments of the Standard Mining Company have been discarded as useless and expensive. It looks as though screening would not add more than 5 cents a ton to the cost of these ores, except in the additional cost of mining, and the product will be a clean rich ore, mostly Bessemer, and without dust. It has been found that not only is the ore run up by washing, but that phosphorus runs down more than coincident with the increase of iron per cent.; also that the elimination of sand reduces moisture materially. The company are now sinking two three-compartment shafts, one in Section 30 and one in 21, on what is known as the Holman. The first is more than 100 feet deep and in ore. They will be dropped through the ore bodies to depths up to 200 and 300 feet, and drifts will be driven through the various classes of ore found, so that experiments may be very thorough and complete. No attempt at disposition of these ores, or even for railway connection, will be made for some time. At the Holman 40 a small exploratory shaft has already been sunk, in addition to those put down by the Donora Mining Company, so that there will soon be four deep openings into this ore body. This will give excellent opportunity for experiments.

The Mesaba ore bearing formation, as mapped by the United States Geological Survey, runs across Township 56-24 in a broad belt having a general strike N. E. by E. and S. W. by W. The work done since the map was issued has made necessary some changes in the width, and, in a less important way, in the direction also, of this formation. At the time the map was made data for this part of the Mesaba were exceedingly scanty.

In addition to the 44 40-acre tracts held by the Can-

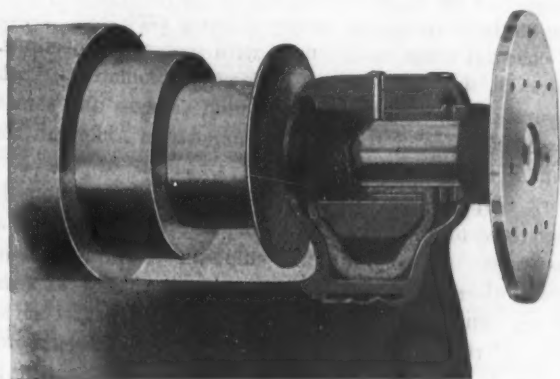
istee company, three other interests hold parcels of land there. The Great Northern road controls all lands belonging to T. B. Walker, a prominent Minneapolis lumberman, whose holdings are extensive; the United States Steel Corporation have the Diamond mine, in Section 15, other lands near by and the Arcturus, in sections 12 and 13.

It is interesting to note in passing that the tonnage shown up by the Canisteo company and their predecessors alone in the four years they have been at work is two and a half times greater than the gross tonnage shipped from the Mesaba range in that period, and one and a half times the entire shipments from that range in all its career. The possibilities of the district, when the three leading holders shall have developed their resources there and concentration shall have been successfully carried out, are worth consideration.

D. E. W.

The Fay & Scott Pattern Makers' Lathe.

Fay & Scott of Dexter, Maine, are putting on the market a new pattern makers' lathe, especially designed for manual training schools, but also suited to regular pattern makers' purposes. A new feature is the bronze



SELF OILING BEARINGS OF THE FAY & SCOTT PATTERN MAKERS' LATHE.

self oiling bearings, shown in the accompanying engraving in section. Beneath the bearing is an oil chamber, from which the lubricant is conveyed to the bearing surface by means of a wick. The lathe swings 10 inches over bed and $5\frac{1}{2}$ inches over rest holder.

An Important Bankruptcy Decision.

WASHINGTON, D. C., May 24, 1904.—The United States Supreme Court has handed down a decision in bankruptcy in the case of Hewitt, trustee, *vs.* the Berlin Machine Works, of special importance to manufacturers of machinery, in which it is held in effect that bankrupts cannot transfer, either to their creditors or their trustees, as a part of their assets, any articles as to which they have entered into an agreement to pay for prior to the passing of title thereto unless the State laws provide conditions which have not been fulfilled.

According to the statement of facts in this case, Clara E. Kellogg on October 10, 1900, contracted with the Berlin Machine Works for the purchase of two wood working machines at the price of \$1850, payment to be made within four months from date of shipment, and title in the property to remain in the machine company until fully paid for. The machines were shipped to Kellogg October 29 and November 16, respectively, and were received by her, set up in her planing mill and put in operation. October 29 and November 16 she signed and delivered to the machine company in payment for the machines two promissory notes for \$925 each, payable in two and four months from their respective dates, to the order of the machine company, and each containing the following clause: "Title and right of possession of the property for which this note is given remains in the

Berlin Machine Works until fully paid for." Kellogg, on her voluntary petition, was adjudicated a bankrupt March 1, 1901, and a trustee was selected March 22, and thereafter duly qualified. The notes have not been paid and were mentioned in the schedules as secured claims, the security being the machines in question. It also appeared that January 21, 1901, Clara E. Kellogg, being insolvent, executed a conveyance of the planing mill to a corporation called the C. E. Kellogg Company, which being attacked as fraudulent, the property was voluntarily released to the trustee, all the capital stock of the company, the entire consideration of the alleged transfer, being surrendered.

Supreme Court's Opinion.

Chief Justice Fuller in delivering the opinion of the Supreme Court in this case said:

"This sale was a conditional sale and the title did not pass to the vendee because the condition was not fulfilled, . . . unless the statutes of New York otherwise provided. The applicable statute is section 112 of chapter 418 of the laws of 1897, which reads as follows:

Conditions and reservations in contracts for sale of goods and chattels: Except as otherwise provided in this article, all conditions and reservations in a contract for the conditional sale of goods and chattels, accompanied by immediate delivery and continued possession of the thing contracted to be sold, to the effect that the ownership of such goods and chattels is to remain in the conditional vendor or in a person other than the conditional vendee, until they are paid for, or until the occurrence of a future event or contingency, shall be void as against subsequent purchasers, pledgees or mortgagees in good faith, and as to them the sale shall be deemed absolute, unless such contract of sale, containing such conditions and reservations, or a true copy thereof be filed as directed in this article.

"It is admitted that the machine company did not comply with the statute until after the appointment and qualification of the trustee, but if the trustee was not a subsequent purchaser, pledgee or mortgagee in good faith, the omission to file the contract of sale was immaterial. . . .

"Section 70a of the bankruptcy law provides that 'The trustee of the estate of a bankrupt, upon his appointment and qualification, . . . shall . . . be vested by operation of law with the title of the bankrupt, as of the date he was adjudged a bankrupt, . . . to all . . . property which prior to the filing of the petition he could by any means have transferred or which might have been levied upon and sold under judicial process against him.'

"The District Court, Hazel, J., held that the reasonable construction of this provision was that the trustee was vested with the title which the bankrupt had to property situated as described, and not otherwise, . . . and the Circuit Court of Appeals, adhering to that decision, held in this case that, inasmuch as by the New York statute a conditional sale such as that in question was void only as against subsequent purchasers or pledgees or mortgagees in good faith, the District Court was right, and affirmed the judgment. . . . In our opinion, these machines were not, prior to the filing of the petition, property which, under the law of New York, might have been levied upon and sold under judicial process against the bankrupt; nor could she have transferred it within the intent and meaning of section 70a. . . . The company's title was good as against the trustee, who could not claim as a subsequent purchaser in good faith."

W. L. C.

The Hartford Manufacturers' Association are to establish a labor bureau along the lines of the Connecticut Valley Labor Bureau, conducted by the Connecticut Valley Metal Trades Association at Springfield, Mass. Arthur E. Corbin, secretary in charge of the Connecticut Valley Bureau, will also have the management of the Hartford Labor Bureau, having made arrangements to divide his time between the two. The Hartford Manufacturers' Association have been in existence for some years, and now a new interest is being taken, with a large increase in membership as a result. The labor bureau will be on broader lines than most, because the association's membership includes other than the metal trades.

The Iron Age

New York, Thursday, June 2, 1904.

DAVID WILLIAMS COMPANY,	- - - - -	PUBLISHERS.
CHARLES KIRCHHOFF,	- - - - -	EDITOR.
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The Merchant Marine Commission.

The work of taking testimony has been begun by the Congressional Merchant Marine Commission. Their promptness is highly commendable, as they permitted very few days to elapse after the adjournment of Congress until they entered upon the discharge of their duties. They have before them a most onerous task. For 40 years the decadence of the American merchant marine has enlisted public attention. Congressional committees have reported upon it, and occasionally some remedial legislation has been attempted, but nothing substantial has been accomplished. The reference of the question to a commission is a confession by Congress of the apparent hopelessness of reconciling the conflicting views of those who are active in presenting plans by which they believe American ships can regain their old prestige on the high seas. It is a convenient method of disposing of a knotty question. A faint hope always exists that by a happy accident a commission may be able to evolve a plan for doing something which Congress has found too difficult. The commission has in its favor the fact that it is composed of a limited number of men. The chances are stronger of a few men coming to an agreement than of a large body. In this case, however, the probability is great that, if the majority of the commission should agree upon anything in the nature of a subsidy, a minority report will be made opposing it. A most remarkable and unexpected result would be a unanimous report. But, even if the report should not be unanimous, if the majority should be able to evolve a plan which would commend itself so strongly to the majority in Congress as to command its solid support the wisdom of the appointment of a commission would be vindicated.

That the commission has a heavy task before it, if any attempt is to be made to reconcile the views of those interested in American shipping, is shown by the great diversity of opinion thus far given in the hearings which began in this city on Monday of last week, and were continued in Philadelphia and Baltimore on Thursday and Friday. The New York testimony was sufficiently diversified to suit the views of the most ardent controversialist. Thomas Clyde, a ship owner, argued in favor of mail contracts and shipbuilding and operating bounties. President C. B. Orcutt of the Newport News Shipbuilding & Drydock Company said that, as ships could be built in England 40 to 50 per cent. cheaper than in this country, the difference should be equalized in some way. Lewis Nixon, marine architect, suggested discriminating duties as the best way to meet the subsidies paid by foreign nations. President Francis T. Bowles of the Fore River Shipbuilding & Engine Company favored the Government equalizing the cost of building ships and also paying a bounty to the shipowner for the additional cost of running ships under American laws. President James J. Hill of the Great Northern Railway Company favored free ships and a tonnage bounty on American exports, as making ships free would equalize the cost of their operation, while a bounty on exports would enlarge the

foreign market for American manufactures and furnish cargoes. Secretary Alfred G. Smith of the New York & Cuba Steamship Company recommended a general mail subsidy to be paid on gross tonnage and speed, and, second, a general subsidy to all freight vessels based on the tonnage and mileage sailed in foreign trade. Treasurer Fields S. Pendleton of the Atlantic Carriers' Association believed in discriminating duties and tonnage taxes. Wm. G. Sewall, shipbuilder and shipowner, desired a bounty on the basis of mileage and capacity, with some mail subsidy, but he said, "the law must be liberal." President Wallace Downey of the Townsend-Downey Shipbuilding Company asked for a direct bounty. Ex-Congressman John M. Farquhar of Buffalo desired the direct aid of the Government extended to railroads to encourage them to build their own ships, enabling them to make through bills of lading, saying, "You can hide in a bill of lading from Boston to Hong Kong every bit of construction bounty, operating bounty and wages, and the public won't know a thing about it, while the railroads won't lose a cent." In Philadelphia Charles H. Cramp, shipbuilder, said he found it difficult to make suggestions in view of the strong objections raised against all the methods heretofore proposed, being sure that "a plan of celestial origin would meet with scores of objections." Alba B. Johnson of the Baldwin Locomotive Works favored a bounty on outward bound voyages and a moderate reduction of the tariff on imports in American bottoms. Superintendent William Crandall of the New York Shipbuilding Company advocated a bounty on the registered tonnage of ships, giving slow ships the same as fast ones. Edwin S. Cramp, shipbuilder, favored an indirect discriminating duty and an increase of at least 50 per cent. for carrying the mails. President Charles Platt of the Insurance Company of North America, one of the largest marine insurance companies, argued in favor of free ships. Theodore Justice, representing the wool growers, said they would gladly help pay any bounty offered to shipbuilders. In Baltimore Bernard N. Baker, former president of the Atlantic Transport Company, spoke in behalf of a subsidy. Joseph R. Foard, president of the Board of Trade, opposed the subsidy plan, advocating liberal mail contracts and a bonus to builders or owners of 50 per cent. on vessels completed in two years after the passage of the act and diminishing 5 per cent. each year thereafter. F. W. Wood, vice-president of the Pennsylvania Steel Company and president of the Maryland Steel Company, argued in favor of a subsidy, which he thought would accomplish the desired result in ten years. C. Morton Stewart, shipowner, said that the only way to solve the problem of building up the merchant marine was to let the American shipowner buy his vessel in the cheapest market, and then allow him to sail under American register. James C. Gorman, president of the Chamber of Commerce, favored a subsidy.

The week's work is an indication of the diversified testimony to be heard throughout the country. In nearly every instance extended arguments were of course submitted backing up the speaker's opinions and giving reasons for the faith that he felt in the efficacy of his scheme. It is noteworthy that in the hearings thus far held the advocates of free ships have been quite few. Possibly they may have felt that the majority of the commission would be out of sympathy with them and their efforts would be a waste of energy. Nevertheless, a few who favor that side of the shipping controversy have shown that they have too much interest in the subject to remain quiet. While thus far the testimony elicited does not appear to have crystallized in favor of any particular method by which our ocean marine might

be built up, one opinion has been very frequently expressed, and that is that if the running of ships could be made profitable there would be no lack of capital to invest in shipping enterprises. How to accomplish this acceptably to the majority of the people is the problem which the commission will seek to solve. That they will be able to do so is hoped, but it is apparently not very confidently expected.

Jug Handled Labor Agreements.

While there are a number of instances in which labor unions have agreed to accept reductions in wages in conformity with the reduced earnings of their employers, there are many unions that have not progressed sufficiently far in principles of justice and equity to accept their share of the present depression. Indeed it might almost be taken as a rule, just enough exceptions to give added proof, that a labor agreement is good only so long as it gives something to the unionist that he could not get without it and that labor agreements are broken the moment the agitators of the union believe that they can win additional advantage by violating their promises. A noteworthy case of direct violation of their signed agreement is on the part of Franklin Union No. 2 in the printing craft in Chicago.

When the time comes for a union to renew its annual agreement in almost every case the plan of the union managers is to demand vastly more than they ever hope to secure, and then "arbitrate" on the basis of a small advance in wages and a small curtailment of hours compared with the year previous. In this way year by year the unions have gained for themselves temporary victories.

In Chicago a conflict has just been precipitated between the International Association of Machinists and the Metal Trades Association, which numbers all the leading employers of machinists in that city. The employing association, prior to the expiration of the 1903-1904 contract, represented to the union that earnings were so greatly curtailed that it would not be possible for them to operate their business on the old scale of wages and asked the union to consider either a horizontal cut of 10 per cent. in their wages or to waive the minimum wage. Instead of offering to submit the matter to arbitration and finally accepting a small decrease in wages, following their own precedent when demanding an increase, the unions formulated a demand for an increase in wages, hoping to compromise on the basis of last year's proposition. This compromise would have been acceptable to the Chicago employers had it not been for the fact that the minimum wage regulation in force in Chicago placed that city at a disadvantage as compared with neighboring cities, because at nearby competing points work requiring only semi-skilled labor was paid a much lower scale than was in force in Chicago. On this point the strike was called and it is to decide it, nominally at least, that the battle will be waged.

It is difficult to conceive of a greater piece of folly on the part of the unions than that of precipitating a strike at this time, when men of intelligence know that their employers are having a hard fight for mere existence and when half the shops in Chicago could be closed down and yet leave sufficient equipment to turn out the work called for under present business conditions. Fortunately for Chicago the Metal Trades Association is an organization that has been tested before, and has given proof of a spirit of loyalty that will prevent any of its members from weakening even if their immediate self

interest might be furthered by proving traitor to the organization at large.

There can be but one ending to this strike under present conditions—the defeat of the unions and the inauguration of the "open shop."

Steam Railroad Control of Electric Lines.

The New York, New Haven & Hartford Railroad are conducting an important experiment in the control of a great system of electric street railways, which is made the more interesting because they are operating also considerable sections of steam road equipped with the third rail system. In all this the company occupy a rather unique position in recognizing that it is a wise policy for the steam railroad to control the electric lines paralleling its track, and that it is also expedient that the city systems be included. Consequently the New York, New Haven & Hartford interests have been acquiring electric railways for some time, and only recently announcement was made of the purchase of the city system of New Haven, Conn., and the Worcester & Southbridge Street Railway. Considered apart from the economic aspect of such control as it affects the purse of the public, the experiment is important in its influence upon electric railway practice. As such it is being watched by steam and electric railway men, and also by alert manufacturers and dealers in special electric railway equipment, who wish to keep abreast of the new demands that will be made upon them as a consequence of the application of steam railroad ideas and practice upon the newer form of traction.

If the experiment proves successful, as steam railroad men generally believe it will, the example is apt to be followed elsewhere, and those who sell to street railways will find a new order of things as purchasing departments of steam and electric companies are merged. This will apply not only to those who manufacture and sell street railway equipment proper, but also to manufacturers and dealers in the thousand and one things which enter into the equipment of repair and construction shops, power stations, car barns, &c., such as machine tools, iron and steel, and so on. The New York, New Haven & Hartford Company have made their experiment the more searching by placing the management of their street railway interests, aggregating hundreds of miles of track, in the hands of a steam railroad man, who will occupy a newly created vice-presidency in the company's board of officers.

Steam and electric railroad practice have been coming together ever since the beginning of electric traction, yet the electric railway man will not believe that the steam railroad man can successfully cope with the street railway proposition, because the conditions are so different from anything that has confronted him in his domain of private right of ways. Yet the street railway has been rapidly approaching steam road equipment, in road bed, weight of rails, and weight and size of rolling stock. The steam railroad man can add not a little to conditions of safety on street railways, and here again the market will meet new ideas in appliances to assist in securing safety for the public. There seems to be little doubt that steam railroad management of electric railways will be a not unimportant step in the evolution of the newer method of traction.

Can anything more frankly indicate the attitude of a professional labor leader than the remark attributed to a Boston representative of the Marine Firemen's Union? After a conference with the leaders of the striking freight handlers in this city last week he stated that the consti-

tution of his union forbade sympathetic strikes, which would be an obstacle in the way of their extending assistance to the strikers by calling their men out. But he added very significantly that if his union needed a grievance on which to base a strike he guessed they could find one. This indicates how easily a labor disturbance can be started. Given the desire to stir up such a trouble, and the ground for it can easily be found, according to this statement.

Industrial Literature.

The development of technical or industrial literature may be regarded as distinctly modern. Few of those who felt called upon to record their thoughts or investigations for the benefit or pleasure of their fellow men entered upon the field of applied knowledge until within a comparatively recent period. The famous old libraries of the world were rich in their treasures of history, travels, theology and fiction, but poor in treatises bearing upon problems in mechanics. Some of the ancients wrote quaintly about processes in the arts, but mainly from the standpoint of observers of the curious, and not from the post of the man who operated the process and knew not only what he was doing, but also possessed accurate information relative to the phenomena of the operations employed. The writer of the past was largely the man educated in the classics, schooled in logic, and trained to believe in the imperishable value of pure literature. In the day when the newspaper was a luxury, and books were so dear that they were regarded with veneration, little was published on mechanical matters. It was not because mechanical pursuits were not held in fair esteem, as the sons of the wealthy were often bound to trades that they might be self supporting should the occasion ever arise. But it was partly due to the fact that those who were disposed to write were not practical, and partly that those who were practical were very seldom graced with the faculty or inclination to put their thoughts on permanent record.

Mighty changes have taken place in this respect in the past half century. In that time the literature of the world has had grafted on it almost a new branch of information. The progress of manufacturing has brought with it an ever increasing influx of bright minds in the ranks of those taking up mechanical pursuits, not merely as an insurance against a day of want, but as a life occupation promising as rich rewards as any profession ever yielded. Men are being specially trained to engage in technical work, and are sent out into the world equipped to use their hands and their brains in practical lines. They can not only think, but they can write, and, further, they can write as intelligently and enthusiastically on practical subjects as any of the ancient authors wrote on academical or theoretical topics. With the organization of technical societies still greater stimulus has been given mechanical matters. Library shelves are being loaded with accumulated volumes of proceedings containing papers of the highest value to those who are engaged in practical work, as well as with other volumes treating particular subjects comprehensively. The technical press is likewise doing its part in spreading information of value to those engaged in utilitarian pursuits. Those who know are generously publishing the results of their experiments, investigations and achievements for the benefit of their fellows. Possibly, the progenitors of the present race of industrial workers would have been equally generous with their information if they had been trained to write and had possessed facilities for publication, but they did not.

The literary ability shown by modern writers on technical subjects is often a matter of pleasurable comment. We have had learned blacksmiths in the past, but they do not write about the work of the forge. We have had examples of shoemakers with a literary bent, but they dropped into poetry or allegory. Our modern craftsmen with the power and the inclination to write are making themselves usefully entertaining in describing and analyzing processes and machinery. Every year sees the quantity of such literature greatly increased, and as it increases the demand grows for more. Each fresh development in the progress of an industry has its historian and its investigator, and the world is benefited by their reports and discussions. The traditions of a craft are no longer blindly followed, but the reasons for processes and practices have been explained for the enlightenment of those who follow. In no stronger manner has been shown the progress of modern thought toward utilitarianism than in the great development of technical literature.

Central American Notes.

SAN JOSÉ, May 18, 1904.—The long deferred contract for the building of the Interoceanic Railroad of Guatemala, known in Central America as the Northern Railway of Guatemala, has finally been signed and legalized between the Government and Messrs. Van Horne and Keith. The first named is the well-known railroad magnate, and the second has been connected with the fruit trust and other Central American enterprises for years. The new company will have to begin at once with the general rebuilding of the Atlantic branch of the road. Steel rails will be laid throughout from Puerto Barrios to San Agustín. The rolling stock, like that at the Panama Canal, is nothing but a mass of rust, the dampness along the whole coast being abnormal. All cars, trucks and machinery, lately in the hands of the Government, will now have to be replaced totally.

Most of the imports and exports will surely seek this short and easy way from ocean to ocean, and the new line will indirectly aid in the more rapid building of the isthmian canal. Upwards of 50 large and small steel bridges will be required, and such rivers as the Motagur, Rio Grande and Zacapa will need considerable skill to keep the bridges in place, as these mountain torrents are nearly as swift as the Chagres, which cuts the Panama Canal in two. It is understood that American machinery, capital and labor will be almost exclusively employed on the new road. Branch lines will run to Salvador, and eventually this will be a link in the Pan-American railway to Buenos Ayres and Chile.

Repairs are going on very rapidly on the harbor works at Manzanillo. The piers destroyed by the earthquake are ready for the steel work, and a very few months will see the port in working trim again. The Pearson Company have met with considerable difficulty in the Tehuantepec reconstruction, due to the epidemic of yellow fever at Salina Cruz and along the line. Sometimes it is difficult to obtain labor at all and the works are practically idle for weeks at a time. A new line of steamers will be run to San Benito from San Francisco, Cal., to connect with the Tehuantepec Railroad.

The members of the Foundrymen's Association at Youngstown, Ohio, have notified their molders of their wish to terminate the present wage scale, which expires on July 1. It is probable no change will be made in the minimum of the molder's wage scale, which is \$3 per day, but some changes in the conditions of the agreement are probable.

The Haselton Works of the American Bridge Company, at Haselton, Ohio, have been abandoned, the best part of the equipment having been removed to the new plant at Ambridge, Pa. The ground and buildings are for sale.

The National Eight-Hour Bill.

Investigation by Bureau of Labor Now Under Way.

WASHINGTON, D. C., May 31, 1904.—The investigation concerning the desirability and practicability of an eight-hour law as proposed by the Gompers bill, which during the closing days of the last session of Congress was referred to the Department of Commerce and Labor for a report, has been undertaken by Col. Carroll D. Wright, chief of the Bureau of Labor, who has already planned the inquiry in detail and has left Washington for a tour that will occupy several weeks, during which he will devote the greater portion of his time to a personal investigation of certain phases of this important problem. Secretary Cortelyou has authorized Colonel Wright to conduct the investigation ordered by Congress, for the special reason that the Chief of the Bureau of Labor enjoys the confidence of both manufacturers and labor leaders and possesses special facilities for gathering the particular kind of information desired.

Inquiries Submitted by Congress.

The resolution referring the eight-hour bill to the Department of Commerce and Labor for a report requests information with regard to the following questions:

1. What would be the additional cost to the United States of the various materials and articles which it customarily procures by contract, which would be governed by the limitations set out in the said bill?
2. What damage, if any, would be done to the manufacturing interests affected by the provisions of the bill, if enacted?
3. Whether manufacturers who have heretofore furnished materials and articles to the Government under contract would continue to contract with the Government if such contracts were within the peremptory eight-hour limitation provided by the said bill?
4. What would be the effect of the enactment of the said bill upon the shipbuilding industry?
5. What would be the effect of the enactment of the said bill, if any, upon the export trade of the country?
6. Are the laborers of the country, organized and unorganized, who would be affected by the proposed legislation, willing to have taken away from them the right to labor more than eight hours per day, if they so desire to do?
7. What effect, if any, will this proposed legislation have upon the agricultural interests of the country?

Colonel Wright's first step in the investigation above outlined has been to address a letter over the signature of Secretary Cortelyou to each member of the Cabinet, requesting a detailed statement of the quantity and kind of articles and materials purchased by contract, the prices paid for them and the full text of all contracts under which purchases are made, together with the names and addresses of all parties, whether manufacturers or agents, from whom goods have been bought during the past year. This information is to be carefully classified, with a view to determining, if possible, which articles or materials would be subject to the operation of the eight-hour bill, if passed, and which would be exempt.

Manufacturers to Be Interrogated.

When this information has been received and classified, a schedule of inquiries will be prepared and forwarded to all manufacturers with whom the Government has recently made contracts. Manufacturers will be asked to state the proportion which the goods which they sell to the Government bear to those sold commercially; the number of hours their plants are now operating and the additional cost, if any, that would be involved in a reduction to eight hours; and whether manufacturers would continue to contract with the Government if their products were held to be within the limitation provided by the bill. The schedule of inquiries to be submitted to manufacturers has not yet been completed, as it is anticipated that the replies received from the several Cabinet officers will suggest additional questions, the answers to which may shed further light upon this very complex subject.

An important feature of Colonel Wright's investigation will be the effect of the enactment of the Gompers bill upon the export trade of the country. This question will be treated, however, solely from the standpoint of the direct, rather than the indirect, results that may follow the enactment of a national eight-hour law. He will as-

sume that only those manufacturing plants will be affected by the bill as now doing work for the Government, and in this connection he will closely scrutinize the replies made by contractors as to the percentages of their respective outputs sold to the Government and exported, and their answers to the inquiry as to whether they would continue to take Government contracts if the Gompers bill should become a law. The much more important question as to the indirect effect of the passage of the eight-hour bill, which, it has been contended, would result, through labor agitation, in forcing to an eight-hour basis all concerns in the same industry with those having Government contracts, will not be considered in detail by Colonel Wright, as he does not regard this phase of the case as being susceptible of demonstration, being wholly problematical and one to be determined by experience. In connection with the export trade phase of the question, the Bureau of Statistics of the Department of Commerce and Labor will be called upon to make a special compilation showing in detail the exports from this country of such goods as are similar in character to those that would be manufactured for the Government on an eight-hour basis, should the Gompers bill become a law.

Eight-Hour Concerns to Be Circularized.

Special agents of the Bureau of Labor have been detailed to make up an accurate list of all the manufacturers in the country who are now operating their plants on an eight-hour basis, and this list will be extended so as to include various branches of the building trades. Schedules of inquiry will be sent to these concerns for the purpose of ascertaining the effect that has been noted in the change from a longer day to an eight-hour day. Colonel Wright anticipates that the answers to these inquiries will show a considerable reduction in the amount of work performed per day in the building trades, but he is in doubt as to the showing that will be made in the various manufacturing industries. In this connection manufacturers will be asked to make a general statement as to the effect of the change to eight hours upon the operatives, as well as upon the output of the plants, and all information that will shed any light upon the desirability of an eight-hour day will be solicited.

A phase of the investigation of special interest will be the evidence which Colonel Wright intends to procure from a number of prominent British manufacturers who placed their plants on an eight-hour basis some years ago, and who took prompt steps to obtain scientifically accurate data for a comparison between the old system and the new. Colonel Wright has special facilities for securing this information, and regards it as very valuable, not only because of the care exercised to secure accurate statistics, but because of the disinterestedness of the parties furnishing it.

No Hearings to Be Given.

No formal hearings will be given in connection with this investigation. The experience of the Bureau of Labor has demonstrated to the satisfaction of its officials that testimony adduced at hearings is usually of very little value, and is far less satisfactory than specific information obtained by the personal application of special agents. The bureau will correspond with many manufacturers aside from those to whom schedules of inquiry will be addressed, and will endeavor in every way to obtain the fullest and most impartial information. Colonel Wright desires it understood that the inquiry and report will be made without reference to preconceived ideas of his officials or his own with respect to the general desirability of an eight-hour day, and that the questions propounded by the House Committee on Labor will be answered as specifically as possible, although it will probably be necessary to go beyond the direct interrogatories in compiling the Department's report. A number of prominent manufacturers have advised the Department that they desire to present statements bearing upon the questions submitted by the House Committee, and it is understood that the labor leaders also wish to place their side of the case before the Department in writing.

It will be seen from the magnitude of the work outlined by Colonel Wright that several months will be occupied in gathering the desired information. The scope of the inquiry will probably be broadened as it proceeds,

but both Colonel Wright and Secretary Cortelyou are confident that the task will be completed in time to present the results to the House Committee when Congress reconvenes in December.

W. L. C.

An Important Labor Decision.

CHICAGO, ILL., May 31, 1904.—The Appellate Court of Cook County, at Chicago, decided an appeal from the verdict from the Superior Court of the same county, in the case of 14 strikers who were sentenced to jail for contempt of court for defying a temporary injunction against molesting or picketing or otherwise intimidating nonunion employees during the strike at the Kellogg Switchboard & Supply Company. The decision, which was rendered by Judge Adams, Judges Windes and Ball, his associates, concurring, not only upholds the finding of the lower court, but enunciates principles of the utmost importance in similar controversies. The decision holds that a strike to compel an employer to execute a contract denying employment to other than union members is the use of unlawful means to compel an unlawful act; that were such a contract signed under such duress it would be void; that any workman has the right under the laws of the State of Illinois and the Constitution of the United States to life, liberty and property, his labor in this case being property; similarly that an employer's business is his property, and any attempt to deprive him of his business by threats or intimidations is unlawful. The decision goes still further. It states in substance that labor leaders who seek to compel an employer to employ none but men belonging to their organizations are seeking to create a monopoly in defiance of law, and, further, that under sections 158 and 159 of the Criminal Code of the State they are conspirators, subject to a maximum fine of \$500 and imprisonment in the county jail for six months. The decision is a long one. It recites the testimony in the hearing before both courts, showing that the strikers maintained for many weeks a reign of terror in the neighborhood, brutally maltreating men and women who had gone to work for the Kellogg Company after the strike had been declared, all with the avowed and acknowledged intention of forcing the company to sign an agreement that they would employ none but members of the unions making the demand; providing for a steward for each craft in each factory, whose duty it should be to see that all employees belong to the union; providing for an audience with the management at any time during working hours for the business agents of the unions; declaring that a sympathetic strike to uphold union principles be not considered a violation of the contract, and dictating that all apprentices, of whom there shall be no more than one to ten of the different crafts, also belong to the union.

The unions entering into the strike and therefore permanently enjoined from interfering are the International Brotherhood of Electrical Workers, International Association of Machinists, Brass Workers' Union 127, Brass Molders' Local No. 83, Metal Polishers, Buffers' and Platers', and the Brass Molders' and Brass Workers' International Union of North America. It is held by Levy Mayer and other eminent Chicago attorneys that this decision not only makes labor organizations or their members liable to criminal prosecution on the charge of conspiracy when they attempt to force or persuade an employer to close his shops to all but union members, but that an employer yielding to such a proposition becomes a co-conspirator amenable to the same law.

The Pennsylvania Shafting Company.—The Pennsylvania Shafting Company, a recently incorporated corporation, under Pennsylvania laws, with a capital stock of \$125,000 fully paid in, have purchased the property formerly occupied by the American Wood Paper Company at Spring City, Chester County, Pa., and will engage in the manufacture of cold drawn and turned steel shafting. The plant is advantageously located, having the Schuylkill Canal and the Pennsylvania Railroad adjoining the property, giving them excellent rail and water transportation. The main building is 80 x 450 feet, and will

be used as the shafting mill. A number of other buildings are on the property. The Pennsylvania Shafting Company recently purchased the entire plant of Port Huron Steel & Screw Company of Port Huron, Mich., and have moved it to the Spring City plant, where, with many improvements and additions, it has been installed. The officers of the new corporation are: Hon. Wm. P. Snyder, president; Willard Parker, vice-president and general manager; Edwin Smith, secretary; H. Jackson Wright, treasurer; M. H. Wright, superintendent; Alfred S. Miller and Alfred Harmer complete the directory.

Trade Publications.

Cambria Steel Cars.—The Cambria Steel Company, Philadelphia, Pa., whose works are at Johnstown, Pa., have issued a very handsome volume relating to steel cars. It is illustrated with reproductions of photographs of cars which the company have constructed in large quantities for some of the leading railroad systems, representing recent developments in the line of steel car construction. In these cars the use of standard structural shapes has made possible a combination of strength with lightness, which enables a car to be made of such design that it can be easily repaired in a shop equipped with ordinary machinery. With the exception of a few specialties, the company manufacture their cars complete from the ore to the finished car and are responsible, not only for the car itself, but for the material entering into its construction. The illustrations given cover quite a number of designs of gondola and hopper cars. Some of the hopper cars present ingenious forms designed for special service, which will undoubtedly be suggestive to those who desire constructions to meet peculiar requirements. The company prepare new designs for special cars and also make estimates and build cars upon designs submitted by customers.

Machine Tools.—The Garvin Machine Company, Springfield and Varick streets, New York City, recently issued a complete illustrated catalogue of convenient desk and pocket size, 4 x 6 inches. It is printed on thin paper and contains over 200 pages, all of which are conveniently indexed, making it a handy book of reference. The tools covered include milling machines of all styles and sizes, screw machines, forming machines, monitor lathes, chucking lathes, tapping machines, drill presses, cutter grinders, hand lathes and special machinery. With each type of machine the various detailed parts are usually illustrated, especially wherein they embody features of special distinction or importance. The various attachments are similarly treated.

Electrical Machinery.—Three new publications have been received from the Fort Wayne Electric Works, Fort Wayne, Ind. Instruction book No. 3019 is devoted to single phase Wood alternating current generators. Following a brief description of the machine, tables of its sizes and speeds are given and explanations for operating the machine and connecting it up. Connection diagrams illustrate the latter, each accompanied with a sketch of the proper setting of the brushes. Bulletin No. 1053, superseding No. 1017, deals with single integrating induction type K wattmeters, and bulletin No. 1054 with small rotary transformers, self exciting alternators and motor generator sets.

Valves.—C. W. Thomas, successor to the Michigan Brasses & Iron Works, has issued catalogue B, describing a line of valves for steam, water, gas, oil, ammonia, &c., hydrants and general water plant supplies. It is a book of 65 pages and covers the subjects in great detail. Where necessary, the articles are shown in section, giving the reader a clear understanding of the principles of their operation. A considerable part is given to a description of the Michigan compression fire hydrant, including instructions for its installation.

Corliss Engines.—The latest edition of the engine catalogue of the Minneapolis Steel & Machinery Company, Minneapolis, Minn., is an exceedingly attractive book of some 70 pages, profusely illustrated with half-tones, a few of which show the interior of their shops. Others take up in detail the design of the engine in its various parts: frame, valve gear, cylinder, cross head, governor, &c. The next dozen or so illustrations show complete engines of various types, and the remainder are of buildings and their engine rooms in which installations have been made. The latter part of the book is given to the exposition of feed water heaters, oil separators, condensers and feed pumps.

Machine Tools.—A new catalogue from the Foster-Kimball Machine Company, Chicago, Ill., contains an illustrated description of their screw machines, turret lathes, special machine tools and automatic machinery. The principal dimensions of each size are tabulated, and important features of construction are shown in sectional drawings. The catalogue will be a useful addition to the files of those using this class of machinery.

NOTES.

Bulletin No. 216, from the Sprague Electric Company, 527 West Thirty-fourth street, New York, contains a general and detailed description of the construction and form of M. C. type motors for direct current.

The A. W. Harris Oil Company, Providence, R. I., have gotten out a pamphlet entitled "An Oily Tale." The story is told by an assistant engineer of how his superior achieved success ostensibly by the use of Harris oils.

Devotees of the automobile will find valuable instructions for repairing tires in the new 1904 catalogue of the B. F. Goodrich Company, Akron, Ohio. Their printed instructions for removing, repairing and replacing tires are accompanied by a number of drawings describing various steps in the process.

The April number of the *Publicity Magazine* from the Underfeed Stoker Company, Marquette Building, Chicago, completes the first year for this magazine. This copy contains illustrations of four notable installations of the Jones underfeed boiler stoker.

The Corliss Engine Works, 4041 North Fifth street, Philadelphia, Pa., are distributing a little circular describing their works and equipment, together with a description of the product, the Rickards-Corliss steam engine. Several testimonial letters are included.

The Knickerbocker gas and gasoline engine, manufactured by the Capital Gas Engine Company, Indianapolis, Ind., is illustrated and briefly described in a circular from that concern.

The Joseph Dixon Crucible Company, Jersey City, N. J., have issued a pamphlet on graphite pipe joint compound, widely useful to pipe fitters, engineers, machinists, contractors, manufacturers, plumbers, and boiler and engine makers. The May issue of *Graphite* from the same concern contains an article on cylinder lubrication with dry graphite, by Lewis F. Lyne.

The Holtzer-Cabot Electric Company, Brookline, Mass., recently issued bulletin No. 152 on the Holtzer magneto watchman's time clock. The different stations on the watchman's route are provided with small magneto generators similar to those used in telephone service, which make records on the dial sheet contained in the clock of the time at which each station is passed. The parts of the entire system are shown with illustrated descriptions.

The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, are issuing a pamphlet on railway motive power expenses. This calls attention to the fact that broken staybolts, bad water and imperfect combustion are the three chief factors causing excessive working expenses. The pamphlet was written by John Livingstone of Montreal, and gives the results of his interviews, during a three months' trip, with the heads of the motive departments of the leading railways of America. The fact that he speaks highly of the Falls hollow staybolts is the cause of its distribution by this company.

The Bourne-Fuller Company, Cleveland, Ohio, have just issued a monthly stock list for May, 1904, of iron and steel structural shapes, boiler tubes, pipe sheets, tool steel, shafting, &c. It gives the sizes and grades on hand, from which shipments can be made in a day or two following receipt of order.

The Palmer & Rich Company, 617 West Pratt street, Baltimore, Md., have issued a circular concerning the Lycoming automatic high speed engine, built by the Valley Iron Works. It is made in sizes from 16 to 440 horse-power and is inclosed and self oiling. Other companies for whom the Palmer & Rich Company are representatives are listed and the goods which they handle. These are principally under the heads of machinery, tools, mill supplies, engines, boilers, steam pumps, hoisting engines and power transmission.

The Veeder form C tachometer for indicating revolutions per minute is described in a folder from the Veeder Mfg. Company, Hartford, Conn. The readings are shown by the height of a column of liquid in the indicator tube. The tachometer was described and illustrated in *The Iron Age* of March 10.

The Junkenheimer Company, Cincinnati, Ohio, are distributing a little card extending an invitation to visit their exhibit at the Louisiana Purchase Exposition at St. Louis, which is located in Machinery Hall, Block 26, Aisle 5-G.

The Crosby Steam Gage & Valve Company, Boston, Mass., are distributing a circular on the Crosby steam engine indicator with and without the Crosby reducing wheel attachment. The reducing wheel is attached directly to the cylinder cock of the steam engine, the indicator being connected to it so that it forms a support for the latter and receives all the strains and shocks attending its operation. It is adapted to all steam engines the strokes of which are between 10 and 72 inches.

Wyman & Gordon, Worcester, Mass., issue as the May number in their series of brief biographies of engineers, which they have been issuing for some time, a short story of Richard Trevithick. This engineer lives in history as the first to apply steam to the haulage of loads on railroads, and the story of his life is one of extreme interest. An accompanying leaflet shows an interior view of the Wyman & Gordon laboratory and gives some information concerning drop forgings and hydraulic press forgings which they make. A notable job is shown on the reverse side of the leaflet, consisting of 32 steel balls, 5½ inches in diameter, each weighing 20 pounds.

Frank B. Gilbreth, general contractor, 176 Federal street, Boston, Mass., is distributing a circular on rapid building construction. It shows views taken at various stages of the erection of a plant for the Columbian Rope Company, Auburn, N. Y. This was designed, built and running in less than 11 months.

The second copy of the new monthly, "Something Pneumatic," of the Chicago Pneumatic Tool Company, Fisher Building, Chicago, Ill., contains a noteworthy article on portable compressed air plants on English railroads.

The Jeffrey Mfg. Company, Columbus, Ohio, have issued a supplement to the Jeffrey Century rubber belt conveyor catalogue, which contains numerous illustrations of sectional conveyors manufactured under the Anderson patents. The various

ways of using and assembling the conveyor are brought out by the cuts.

A pamphlet explaining the results obtained by use of the Simonds improved steam receiver and separator has been received from Frank A. Simonds, Grand Rapids, Mich. The receiver is shown in section, with accompanying text explaining its action. The various different forms in which it may be connected are shown by diagrams.

The Williams Gauge Company, 543 Fourth avenue, Pittsburgh, Pa., have issued two circulars. One, on the subject of the Williams automatic safety feed water regulator, claims to greatly increase the efficiency of all classes of steam boilers and engines by automatically controlling the water at the proper fixed point, so as to constantly preserve the correct amount of water in exact proportion to the heating surface and capacity of the boiler furnace. The other circular deals with the Williams steam operated high pressure trap, said to be the only steam operated trap with automatic discharge of steam exhaust.

A circular from John T. Burr & Son, Kent avenue and South Sixth street, Brooklyn, N. Y., gives an illustrated description of their No. 3 bar cold saw with grinding attachment and No. 1 Burr cold saw.

OBITUARY.

PHINEAS BARNES.

The death of Mr. Phineas Barnes, who died in Pittsburgh on Sunday afternoon, May 29, after an illness of several years, removes one of the last of the pioneers of the modern steel industry in the United States. Mr. Barnes was born in Portland, Maine, January 10, 1842. He entered the works of the Portland Locomotive Company as an apprentice in 1858, going from there two years later to the famous Novelty Iron Works, in New York, where he spent the stirring years of the war, from 1860 to 1864, and, after a course in the Cambridge Scientific School, graduated at the Troy Polytechnic Institute in the class of 1867. On leaving the Polytechnic Institute Mr. Barnes entered the employ of the Trenton Steel & Iron Company, remaining with them until January, 1869, when he went to Troy to assist the late Alexander L. Holley in the rebuilding of the Troy Bessemer Steel Works, which had been destroyed by fire, thus beginning a business connection which lasted many years, and a personal friendship which was lifelong. When the Troy works again went into operation Mr. Barnes in Mr. Holley's interest went to Europe, where he spent nearly two years. On his return he took charge of the construction of the steel works of the Joliet Iron & Steel Company, of which Mr. Holley was the engineer, and it was while there, in 1872, that he married Miss Fannie E. Wood. After completing the Joliet works he removed, in March, 1873, to Pittsburgh, to become constructing engineer of the Edgar Thomson Steel Works, going afterward to New York, where he had charge of Mr. Holley's office until 1878, when he became chief engineer of the Springfield Iron Company, of Springfield, Ill., of which Mr. Holley was consulting engineer, remaining there until the end of 1882. In 1883 he took charge of the uncompleted works of the Washburn Iron Company, and after finishing them designed and built, in 1885, the steel works of Jones & Laughlin Steel Company at Pittsburgh, remaining in charge of them as manager until April, 1892, when his failing health compelled his retirement. Since then Mr. Barnes has been for many years a great sufferer, until death released him. Mr. Barnes' long connection with the steel making industry, close acquaintance with nearly every prominent man in the practical part of the business, and the possession of a character on the integrity and discretion of which everybody knew he could rely, made him the repository of much confidential information bearing on steel works' progress, which, combined with his long experience, good judgment and unsurpassed opportunities for becoming familiar with facts, made him to be much sought after as a book of ready reference by those in search of information bearing on steel works' history, and he was one of the last of those who were closely identified with American steel works' engineering in its infancy.

DAVID R. FRASER.

David Ross Fraser, one of the founders of the Fraser & Chalmers Company, which was later merged into the Allis-Chalmers Company, died at his residence in Chicago May 30, at the age of 80 years. Mr. Fraser

was born in Scotland, and went to Chicago in 1848, where he secured employment as machinist with Meats & Hoag, which firm later became Gates & McHight. Here he formed the acquaintance of Thomas Chalmers, who was also employed with that firm. In 1850 he went to California as a gold seeker, returning the same year, but going to California again in 1852, both times being forced by ill health to leave the California climate. In 1852 he became foreman of the Scoville & Sons Locomotive Works in Chicago, where he superintended the building of the first locomotive ever built in that city, and personally ran it by its own steam over a plank road connecting with the Galena & Chicago Railroad, to which it was delivered. Later he became foreman to P. W. Gates and Co., successors to Gates & McHight, becoming later a partner in the concern. When P. W. Gates & Co. was organized as the Eagle Iron Works Mfg. Company both Mr. Fraser and Thomas Chalmers were stockholders and acting superintendents, and shortly after the great fire of 1871 withdrew and formed the firm of Fraser & Chalmers, which grew and prospered until 1890, when it was purchased by an English syndicate. In that year Mr. Fraser went to England, and erected there the works of Fraser & Chalmers, Limited, near London. In 1893 he retired from active business with that company, but remained vice-president and the largest stockholder of the Chicago Portland Cement Company. Mr. Fraser married Lydia H. Scoville in November, 1851, the couple celebrating their golden wedding in November, 1901. Three children survive: Mrs. E. F. Minor, Mrs. W. F. Main and Norman D. Fraser. David Ross Fraser earned a world wide reputation as a mechanical engineer and inventor of mechanical devices. In the later years his activities were especially directed along the lines of improvement in mining machinery and practice.

WATKIN R. EDWARDS, superintendent of the Bessemer works of the Republic Iron & Steel Company, Youngstown, Ohio, died suddenly from apoplexy in a hospital in that city on May 25. Mr. Edwards was formerly connected with the Carnegie Steel Company, having been located at the Edgar Thomson Steel Works. He left there and connected himself with the National Steel Company at Youngstown. About a year ago he took charge of the Bessemer works of the Republic. For more than 20 years Mr. Edwards was superintendent of stationary engineers and mill machinist at the Edgar Thomson Steel Works. He was born in Wales 53 years ago, and is survived by his wife, four sons and two daughters.

CHARLES PARKIN, a well-known former steel manufacturer of Pittsburgh, died at his residence near that city May 27. He was known as the father of the crucible steel industry of this country. He was born in Sheffield, England, in January, 1838. Four generations of his ancestors were iron workers. He entered the mills at Sheffield at an early age, showed a wonderful aptitude for the business and soon mastered all the details of the manufacture of crucible steel. He continued his labors in Sheffield at a small salary until 1864, when he was secured by Hussey, Howe & Co., of Pittsburgh, to come to this country. With his coming the manufacture of crucible steel began in earnest at the Hussey-Howe plant. Mr. Parkin remained with the firm named for 10 years and then became associated with Andrew Carnegie, who was attracted by Mr. Parkin's ability. Together they built the first of the now famous Homestead mills. After a short partnership with Mr. Carnegie Mr. Parkin withdrew, and, with Reuben Miller and Charles Barr, organized the firm of Miller, Barr and Parkin, their plant being named the Crescent Steel Works, located at Fifty-seventh street, Pittsburgh. This firm was continued until absorbed by the Crucible Steel Company of America. Mr. Parkin also started the Pittsburgh Tin Plate Works at New Kensington and the Solid Steel Tool Company of Pittsburgh. Until sold to the American Tin Plate Company Mr. Parkin continued as president of the Pittsburgh Tin Plate Company. In 1900 he retired from all manufacturing pursuits, but has since been engaged in the banking business and was vice-president of the Logan Trust Company of New Kensington, and a director of the Diamond National Bank of Pittsburgh. He was also a

stockholder in the Equitable Gas Company and other Pittsburgh industrials.

HENRY H. HENDRICKS, a member of the metal firm of Hendricks Brothers, 49 Cliff street, New York City, who own and operate the Belleville Copper Mills and are the oldest metal house in the United States, died suddenly on May 27 in the waiting room of the Christopher street ferry, New York, where he had gone to meet his daughter, who was returning from school in New Jersey. Mr. Hendricks, who was 44 years old, was the great-great-grandson of Uriah Hendricks, who founded the Hendricks metal business in New York in 1764. He was born in New York City and graduated at Columbia College, entering the family business on leaving the university. He was very prominent in Jewish circles and was a member of a number of clubs, as well as of the New York Chamber of Commerce, the Merchants' Association, the American Association for the Advancement of Science, and other bodies.

PROFESSOR WILLIAM H. PETTEE, senior professor of mining engineering at the University of Michigan, died suddenly at Ann Arbor, Mich., on May 26, aged 66 years. He was born at Newton Upper Falls, Mass., was graduated at Harvard in 1861, and after pursuing post-graduate studies and teaching there for four years, studied three years at Freiberg, Saxony. From 1869 to 1875 he was assistant professor of mining at Harvard, and at the same time assistant in the Geological Survey of California. In 1875 he went to the University of Michigan as professor of mineralogy, economic geology and mining engineering. He was a member of the American Institute of Mining Engineers, the American Association for the Advancement of Science, the Geological Society of America and the American Philosophical Society.

JOHN McDOWELL, formerly of the firm of Vierling, McDowell & Co., architectural iron workers, Chicago, died in that city May 12. Mr. McDowell was one of the pioneer structural iron men of Chicago. He came from Belfast, Ireland, to this country, and entered the employ of the Union Foundry Company—now the Dearborn Foundry—Chicago, where he served as foreman. About 30 years ago he left that firm and started the firm of Vierling, McDowell & Co., located at Twenty-third street and Stewart avenue. Robert and Louis Vierling and Albert Grossmith were his partners. About the same time the Hansell-Elcock Foundry Company, the South Halstead Street Iron Works and the Butler Street Foundry were started, all by men who had been employed at the old Dearborn Foundry and associated with Mr. McDowell. In 1890 he sold out his interest in the firm and retired from business. His son, David McDowell, is senior member of the well-known machinery firm of McDowell, Stocker & Co., Chicago, and his grandson, W. J. McDowell, is associated with the same firm as salesman.

WILLIAM WALLACE died at Washington, D. C., May 20, in his eightieth year. He was born in England, came to this country with his father at an early age, and established the firm of Wallace & Sons at Ansonia, Conn., which became one of the leading manufacturers of copper and brass goods and alloys in the United States. In association with Professor Moses F. Farmer, Mr. Wallace brought out a compound telegraph wire, which achieved a great success. They also introduced the Wallace-Farmer dynamo, with which the buildings of the Centennial Exposition of 1876 were lighted, being the earliest general electric lighting plant in this country. He also devised a number of other valuable appliances, including the series system of arc lighting. Mr. Wallace was regarded as one of the leading authorities on the alloys of copper, zinc and tin. A son and daughter survive him.

THOMAS MURPHY, proprietor of the Murphy Iron Works, Detroit, Mich., died May 23 at Phoenix, Ariz., from an acute attack of Bright's disease. Mr. Murphy was born in Ireland in 1835. When a young man he came to this country and eventually found his way to Detroit. For many years he was engaged in the wrecking and towing business under the name of the Murphy Wrecking & Salvage Company, owning a fleet of large lake tugs. During the past 20 years he has owned the Murphy Iron Works. Mr. Murphy leaves a wife and daughter.

CHARLES PRESBREY WHITE, president of the White-Warner Company, Taunton, Mass., and one of the best known foundrymen in New England, died at his home in Taunton on May 26, aged 55 years. He was born in Taunton, and when 15 years old was apprenticed to the molder's trade, which he mastered, in the old Dean Foundry, at Whittenton, near Taunton. The thorough early training gained as a lad caused Mr. White to develop into an expert in his line. In 1882 he started business for himself, establishing the firm of White & Walker, subsequently changed to White, Walker & Co., and in 1886 the business was incorporated as the White-Warner Company, Richard E. Warner being taken into partnership. Mr. White became the president, which office he held until his death, managing the foundry end of the business. He served through the Civil War with the Fourth Massachusetts Regiment.

SAMUEL R. CALLAWAY, president of the American Locomotive Company, died in New York on June 1, following an operation for mastoiditis. Mr. Callaway was born in Toronto, Canada, on December 24, 1850, and began his railway career at 13 years of age. Working his way up through various subordinate positions on several different railroads, he finally became president of the New York Central & Hudson River Railroad, which place he resigned in May, 1901, to become president of the American Locomotive Company.

New Publications.

The Grant and Validity of British Patents for Inventions. By James Roberts, M.A., LL.B. Published by E. P. Dutton & Co., 31 West Twenty-third street, New York City, and John Murray, London. Pages 648. Price, \$8.

The purpose of this work is to enable the inventor in his application for a British patent to confine his claim to what can be supported and to avoid errors in drawing his specifications. It is divided into three parts. The first part consists of the principles and rules affecting the grant and validity of patents and the practice respecting the amendment of specifications both before the comptroller-general and law offices of the Crown. The second part consists of abstracts of cases illustrating the applications of the principles. The third part sets forth the statutes and rules. Under the first part the limits of manufacture in patent law are clearly stated, the persons to whom patents may be granted are described, the conditions on which patents are granted are set forth, the construction of specifications is lucidly shown and the procedure in obtaining a patent, setting up grounds of opposition and making amendments is thoroughly described. Under the second part the abstracts of cases given are very comprehensive. The third part is not only a digest of existing statutes and rules, but presents concrete cases in which important principles have been established, which are frequently illustrated. Schedules of forms are given, and the text of the international convention for the protection of industrial property is presented in French and English.

Liquid Fuel and Its Combustion. By William H. Booth, Member of the American Society of Civil Engineers; formerly of the New South Wales Government Railways and Tramways, of the Manchester Steam Users' Association and of the British Electric Traction Company. Publishers, E. P. Dutton & Co., 31 West Twenty-third street, New York City. Pages, 412. Price, \$8.

The increasing use of liquid fuel, following the discovery of petroleum over wider areas of the earth's surface, causes literature upon the subject to become of great value, especially to intending users. In this book the author has endeavored to put together what has been done in the burning of liquid fuel, and he states that at the risk of repetition he has given descriptions of the various systems and apparatus. He has not hesitated to use descriptions and statements of manufacturers, in some cases with little alteration, where such statements were sound and reasonable. While it would appear that his experience had been mainly outside of the United

States, an examination of the contents shows that he has drawn largely upon the results of American practice. Under Part 1, what might be termed the theory of the subject is treated. This is divided into 13 chapters, and covers such subjects as the relative economy of liquid and solid fuel, the equivalence of oil and coal, chemical and other properties of petroleum, combustibles and supporters of combustion, calorific and other units, and treatment of the varieties of smoke and its prevention. Part 2 takes up the practical application of the use of liquid fuel, and is divided into 19 chapters. Methods are given of oil storage on ships, liquid fuel application to locomotives, liquid fuel application to stationary and other boilers, Russian and American locomotive practice, American and English stationary practice with liquid fuel, storage and distribution, atomizing, application to metallurgy, various forms of burners used, together with related subjects, illustrations being used profusely. Part 3 gives reports of tests made, together with rules of underwriters, &c. Part 4 presents a large number of tables, which are of particular value to engineers, giving a great deal of data for use in making calculations and comparisons.

Entropy; or, Thermodynamics from an Engineer's Standpoint. By James Swinburne. Publishers, E. P. Dutton & Co., 31 West Twenty-third street, New York City. Pages, 140. Price, \$1.25.

The reason given by the author for adding this book to those already published on thermodynamics is that "it is wanted." He states that as far as he is aware there is not any work on the steam or gas engine which gives a correct definition of entropy. Instead of treating this subject in the orthodox way, he has ventured on a new method of explaining it. He also makes an entirely new departure in his definition of heat. The main portion of the book appeared as a series of articles in *Engineering*, beginning August 28, 1903. The contents are divided into four chapters and an appendix. The appendix, entitled "Reversibility of Thermodynamics," was read before Section A of the British Association in 1903. The author states that it was written to be criticised, but although it was circulated in proof there was no relevant discussion. It gives a syllabus of the method of exposition adopted in the body of the book and the reason for its adoption.

National Iron and Steel, Coal and Coke Blue Book.

Edited by B. H. Morwood. Publishers, R. L. Polk & Co., 2 to 8 Smithfield street, Pittsburgh, Pa. Pages, 890. Price, \$7.50.

This is the second edition of a directory of firms, corporations and individuals engaged in the production of iron and steel, coal and coke in the United States, and iron and steel in Canada and Mexico. It names the various plants or mines operated and gives their location, with a brief description of the equipment, together with a list of officers of corporations. A valuable feature of this book is the grouping of manufacturers according to the character of the works. Lists are thus given of manufacturers of pig iron, Bessemer steel, open hearth steel, crucible steel, merchant bars, plates, sheets, structural shapes, skelp, rails and steel castings. The plate list is open to criticism, as in it the makers of tin plates are grouped with those who roll heavy plates. A separation of these two classes of manufacturers could have been made with advantage to those who use the lists. In other respects the arrangement appears to be very convenient. A comprehensive list is given, alphabetically arranged, of manufacturers of iron and steel, which not only includes producers of pig iron, steel and rolled iron, but also embraces important establishments in related industries. The use of this list is rendered easy by an index of products covering 11 pages, in which the manufacturers of each product are referred to by the number given to each one in the alphabetical list. The section covering the coal and coke producers comprises practically half of the book. The work is undoubtedly one which will be found of great value in the iron and steel trades.

MANUFACTURING.

Iron and Steel.

The Waynesburg Forge, Sheet & Tin Plate Mills, Waynesburg, Pa., are not only installing a galvanizing plant for making galvanized sheets, but have a large forge already completed, in which they are placing knobbling fires for making charcoal iron base for galvanizing, demand for which has been very heavy. They do not expect to galvanize any steel sheets, but will serve the trade in galvanized charcoal iron, together with black sheets made from charcoal iron blooms. The Griffiths Charcoal Iron Mills, at Washington, Pa., which are an identified interest of the Waynesburg Forge, Sheet & Tin Plate Mills, have recently added a new heating furnace and installed a large steam plant for the purpose of meeting the increased demand for their charcoal iron terne plates.

In marked contrast with general conditions prevailing in the steel trade is the extraordinary activity at the plants of N. & G. Taylor Company, at Philadelphia, Pa., and Cumberland, Md. Both of these plants are engaged largely in the manufacture of the Taylor Old Style brand of roofing, and extra shifts are contemplated to keep up with the demand for this well-known plate. Recent extensive improvements at the plants of the company will provide a much larger output, made necessary by the increasing demand for their high grade plates. The open hearth furnaces and rolling mills at the Cumberland works are running full time, the results obtained from their new equipment, recently installed, being satisfactory.

The Buffalo Union Furnace Company, Buffalo, N. Y., have secured judgment for \$21,342 against J. Frank Aldrich as receiver of the New York Car Wheel Works, Buffalo.

The rail mill and one of the blooming mills of the Pennsylvania Steel Company, at Steelton, Pa., are being increased in capacity and greatly improved.

The Central Iron & Steel Company, Harrisburg, Pa., hope to put into service this month the new open hearth steel plant on which contractors have been working for more than a year. Soon after Paxton Furnace, No. 1, operated by the same company, will be put into service.

The Falls Hollow Staybolt Company, Cuyahoga Falls, Ohio, have received the third order for this year from the Norwegian State Railway Company, through their agent at Christiania, Norway, for both Falls hollow and solid staybolt bars. Other users of the Falls Hollow Staybolt Company's products are the Japanese Government railways, railways for other foreign Governments, United States Government, leading railways of this country, Canada and Mexico.

The Ward-Dickey Steel Company, Indiana Harbor, Ind., are sending out samples of their hammered planished sheets in the way of an announcement that they are ready to take orders for this product. It will be remembered that their plant has just been completed and that it is their purpose to manufacture these sheets by an improved process perfected by W. C. Dickey.

At the annual meeting of stockholders of Iroquois Iron Company, Chicago, held May 20, the following Board of Directors was re-elected: M. Cochrane Armour, William A. Rogers, David B. Gamble, Archer Brown, Geo. A. Tripp, Charles B. Shedd, Samuel A. Kennedy. The directors afterward elected the following officers: President, M. Cochrane Armour; vice-president, William A. Rogers; secretary and treasurer, Geo. A. Tripp. At the meeting the usual semi-annual dividend of 5 per cent. was declared.

The plant of the United States Steel Company, Everett, Mass., was sold for \$50,000 at public auction on May 29 to the International Trust Company, Boston, for the benefit of the bondholders. The company are bonded for \$150,000 and have a capital stock of \$3,000,000.

General Machinery.

The Brady Cement Stone Machine Company, Limited, Jackson, Mich., have purchased the property at the southwest corner of Jackson and Calhoun streets, and are now having the ground cleared and plans drawn for an office building and machine shop. The work of construction will be pushed rapidly.

Marcus & Sons, Peoria, Ill., have just started an addition to their plant of a forging and forming department. The firm will manufacture a general line of wrought iron and steel forgings used in implement building of all kinds, and also a general line of architectural parts and pieces, such as door hangers, beam hangers and the like.

The Record Foundry & Machine Company, Livermore Falls, Maine, will soon begin the erection of a brick machine shop and foundry, 60 x 124 feet. The Maine Central Railroad will put in a siding 600 feet long to provide better freight facilities for this company and for the Richmond Mfg. Company, whose new plant for novelty wood turning is nearing completion.

The Duplex Roller Bushing Company, Belfast, Maine, have acquired the property formerly occupied by the Dana Sarsaparilla Company in that city and will occupy it as an addition to their plant. The property consists of a five-story building, 40 x 70 feet; a wooden storehouse, 25 x 75 feet, and 2 acres of land with 400 feet of water front and railway siding. The company's building which is now used for an iron foundry and wood working and

machine shops will be used exclusively for the foundry and wood working machinery and machine tools will be removed to the larger of the new buildings, which are situated directly across the street. A new forge shop and engine and boiler rooms will be erected.

S. H. Stupakoff of Pittsburgh, one of the American agents of the Le Chatelier pyrometer, is now installing multiple recording pyrometers at a number of plants. This instrument produces simultaneously a multiple record representing the temperature conditions of several heat stations. It is of great value in blast furnace practice, giving the temperature measurements of the blast main or bustle pipe, the gas main or downcomer, as well as that of the individual stoves and escaping flue gases. All of the records are automatically indicated on a single sheet and the operations as indicated by the temperature are exactly recorded. One of these instruments has been in successful operation at the plant of the Allegheny Plate Glass Company, Fite, Pa., where it records the temperature of six different stations. The recording instrument is one of the late improvements in connection with the Le Chatelier pyrometer, which traces automatically the variations of temperatures up to 1600 degrees C., or 2912 degrees F., on a strip of record paper. The paper is contained in the instrument on a roll about 6 inches wide and of sufficient length to last under continuous service from 4 to 6 months.

The Geiser Mfg. Company, Waynesboro, Pa., have had especially made for sale in Turkey several new attachments to their separators, including a new grader, feeder and weigher. They are lighter in weight than those made for home use and are intended to meet conditions peculiar to Turkey. The grader is absolutely new and is the only one made in the United States. It cleans grain by specific gravity, by sifting or by blasts of air applied separately or together. A thorough test has proved the efficiency of all the machines.

The Whitin Machine Company, Whitinsville, Mass., manufacturers of cotton machinery, have bought the Overland Cotton Mill Company's plant at Denver, Col.

The greatest loss in the recent fire at the plant of the Keagy & Lear Machine Company, Coshocton, Ohio, was in patterns and a portion of one of the buildings, there being but little damage to the machinery. The plant is in full operation.

The Grenada Machine Works, Grenada, Miss., recently incorporated, have succeeded to the plant and business of D. S. Watson & Co. They have remodeled the shop and will do a general repair business and deal in boilers, engines and mill supplies. G. B. Jones is president; D. S. Watson, vice-president; W. A. Rock, manager, and C. B. Bolton, secretary and treasurer.

Ground has been broken for the large addition to the plant of the Mesta Machine Company, West Homestead, Pa., and work on the buildings is expected to be started within a week. This addition when completed will be equal in size to the present plant and the capacity will be doubled.

Work has been started on the new shops for the Pennsylvania Railroad Company at Millham Junction, near Trenton, N. J. These shops will be quite large and were described in these columns a few weeks ago.

Thomas G. Brady has been appointed receiver for the Northern Engineering Company, 95 Liberty street, New York.

Power Plant Equipment.

The Allis-Chalmers Company, Chicago, Ill., have recently sold to the Georgia Iron & Coal Company, Rising Fawn, Ga., a 44 and 84 x 60 inch blowing engine, and two blowing engines, one 84 and 84 x 60 inches and one 44 and 84 x 60 inches, to the Carnegie Steel Company, Pittsburgh, Pa.

The Bonson Furnace & Boiler Company, Chicago, have incorporated with a capital stock of \$50,000, the officers of the company being W. W. Bonson, president and general manager; Stewart H. Moore, assistant manager, and Robert Bonson, secretary and treasurer. The company will manufacture a boiler which is a combination of horizontal tubular and water tube, having a furnace wherein complete combustion is aimed at. The boilers are built in units from 75 to 400 horse-power.

The Fort Wayne Electric Light & Power Company's plant at Ft. Wayne, Ind., has been sold to an Eastern syndicate, Joseph B. Mayer of Buffalo, N. Y., representing the purchasers. The purchase price was \$500,000. It is the intention to form a close alliance between the new owners of the electric plant and the Fort Wayne & Wabash Valley Traction Company, in which Thomas Wanamaker of Philadelphia is interested. A large power plant will be built to furnish power to the two companies and all other interests using electricity in and around Ft. Wayne.

The Moline Pump Company, Moline, Ill., have made another large shipment of Eli gasoline engines to England. It was consigned to T. G. Slipper, Brundall, Norwich, England, and comprises the fourth large order which has been received and filled by the company from their British trade since the first of the year. One of the Eli engines will be placed on exhibition at a meeting of the Royal Agricultural Society to be held in England this month.

W. H. H. Wooster and George E. Matthies, who control the Seymour Mfg. Company, Seymour, Conn., have bought the prop-

erty of the Seymour Electric Light Company and will conduct the business so that the maximum results will be obtained from water rights which are insufficient excepting when the two properties are operated in common, both the Seymour Mfg. Company and the Electric Light Company depending upon water privileges one above the other on the Naugatuck River.

The Diamond Boiler Works, Minneapolis, Minn., recently incorporated with a capital stock of \$50,000, have purchased the old Diamond Boiler Works plant, which they will rebuild and greatly enlarge. The new company will extend the business and develop it along new lines. Henry H. Smith is president; Louis K. Hull, vice-president, and James P. Sullivan, secretary, treasurer and manager.

A consolidation has been effected of the Le Roy Hydraulic Electric Company, the Le Roy Gas & Electric Company and the Le Roy Power Milling Company, Le Roy, N. Y., with a combined capitalization of \$100,000.

McCloskey Brothers, proprietors of the Catasauqua Boiler Works, Catasauqua, Pa., have purchased the plant formerly occupied by the Catasauqua Mfg. Company, into which they will move their present boiler works as soon as extensive improvements to the newly acquired buildings can be made. Some new machinery has recently been bought, including an Ingersoll-Sergeant air compressor and 30 horse-power boiler. The company have a full equipment of boiler making machinery, but later on it is their intention to purchase more. In their new quarters they will have greatly increased facilities.

The National Water Tube Boiler Company, New Brunswick, N. J., expect to start operations in their new plant about July 1. The Browning Engineering Company are installing two 5-ton electric cranes, and the heating apparatus is being put in and the engines made ready for use. At the recent annual meeting the following Board of Directors was elected: Frederick Weigel, Robert J. Smith, E. H. Rader, P. M. Welsh, J. H. Conger, Louis Wolfson and Charles A. Schenck.

Bids will be received at the office of the treasurer, National Soldiers' Home, Virginia, until June 20 for two 150 horse-power boilers.

Foundries.

A new foundry will be added to the structural iron works plant of the Hansell-Elcock Company at Butler street and Archer avenue, Chicago. The building will be one story and of brick construction.

Very little equipment was damaged in the recent fire which destroyed the foundry of P. E. Kennchan, Brashier Falls, N. Y. None of the other shops was damaged. Mr. Kennchan has a new foundry building well under way which he expects to occupy in about four weeks.

Burt Dotke, proprietor of the Oshkosh Brass & Iron Works, Oshkosh, Wis., is building a foundry, which is expected to be in operation about July 1. Mr. Dotke will conduct a general foundry business, making a specialty of such lines as sash weights, washers and the like.

Bridges and Buildings.

The Pittsburgh Terminal Warehouse & Transfer Company, recently organized at Pittsburgh to build a large number of warehouses on the South Side, have broken ground for the series of buildings. About 6000 tons or more of structural steel will be used in the building of these warehouses, which will be furnished about equally by the Carnegie Steel Company and the Jones & Laughlin Steel Company.

The Penn Bridge Company, Beaver Falls, Pa., have been awarded a contract for building a viaduct about 350 feet long over Pine Hollow, at Sharon, Pa. The contract amounts to about \$180,000.

The Tusculum Bridge Company have been incorporated at Tusculum, Mo., those interested being J. R. Wells, W. H. and G. T. Hauenstein, Mord McBride and W. S. Johnson. The company are capitalized at \$8000. Contracts have been secured by them for the building of a wagon wire suspension bridge of 600 feet span across the Osage River at Tusculum. Work will be begun as soon as permission is obtained from the Secretary of War.

S. R. H. Robinson, contractor, St. Louis, Mo., has received the contract for bridging on the Edmonton extension of the Canadian Northern Railroad, the amount of the contract being \$100,000.

The plant of the Empire Bridge Company at Elmira, N. Y., has been closed down.

The West Virginia Bridge & Construction Company, Wheeling, W. Va., have received the contract for the steel buildings for the new plant which the Warwood Tool Company are to erect at Glennova, W. Va.

Boilers, Engines, &c.

The plant of the Globe Iron Works Company, manufacturers of gasoline engines, is to be moved from Minneapolis, Minn., to Menominee, Wis., where a machine shop, foundry and two-story office building are to be erected. A 3-acre site has already been secured as a location for the plant. Modern machinery will be installed and electrical power used throughout. Plans for the new buildings have been made by Professor Flathers, consulting engineer of the University of Minnesota.

Fires.

The plant of the New York City Milling Company, between Forty-eighth and Forty-ninth streets, First avenue and the East River, was destroyed by fire May 27.

The Louis P. Rice Saddlery Factory, New Orleans, La., and the plants of the Simmonds Mfg. Company and the Mige Brady & Lincoln Wooden Ware Company, were destroyed by fire May 29. Loss estimated at \$400,000.

The local branch packing house of the Cudahy Packing Company, at Los Angeles, Cal., was destroyed by fire May 25, causing a loss of about \$300,000.

The boat building establishment of Smith Bros., at Schellenger's Landing, near Cape May, N. J., was destroyed by fire March 26. The loss is placed at \$3000.

Hardware.

Some alterations are to be made to the factory of the Gilbert & Bennett Mfg. Company at Wireton, Ill., consisting of a new brick wall, new flooring and iron doors. The building is two stories in height, 100 x 800 feet. The company make wire for netting, fencing, wire cloth, &c.

Wm. F. Crilly, Chicago, has the masonry and terra cotta contracts for the new factory of the Elgin National Watch Company at Elgin, Ill. These contracts amount to \$100,000.

The Waterloo Carriage Company, Waterloo, Iowa, have increased their capital stock from \$50,000 to \$75,000. Some changes have been made in the management of the company, and A. B. C. Hardy of Flint, Mich., a new stockholder, will be made secretary and general manager. F. F. McElhinney is president; J. R. Vaughan, vice-president, and W. J. Galloway, treasurer. The increase in stock will probably be used in enlarging the business.

Keystone Wire Matting Company, Beaver Falls, Pa., have incorporated with a capital of \$25,000 to manufacture flat steel matting and wire door mats. T. C. McPherson, G. W. Miller and J. A. Miller are the incorporators.

The firm of Trethaway Brothers have concluded the purchase of 1½ acres of ground adjacent to their manufacturing plant at Parsons, Pa., and will at once proceed with the erection of a three-story brick building 90 x 115 feet, with extension for engine and boiler. It is hoped to have the building ready for occupancy by August 1. The firm started their present business in Parsons about 12 years ago, and its history has been one of continual growth. At the present time they give employment to between 80 and 100 people, about one-half of whom are men. When the new building is completed the capacity of the plant will be doubled and twice the present number of employees will be engaged. The product of the plant consists of tin and galvanized iron ware, especially manufactured for mine and railroad use, also the Acme dinner pails and wash boilers. They make a specialty of fine lithographed lard pails and different style lithographed boxes, &c., and ship their product all over the country.

The Rochester Shank Company, Rochester, N. Y., have been incorporated with a capital of \$40,000 to manufacture steel shanks. Incorporators: F. S. Reed, L. A. Reed and S. B. Tompkins, all of Rochester.

Miscellaneous.

The Chamber of Commerce of Huron, Ohio, has raised \$20,000 to secure the location at that place of the factory of a new company that will manufacture a patent steel lifeboat. The company will have a capital stock of \$200,000 and agree to expend \$50,000 in the erecting of a factory and buying machinery. The plant is to be erected and placed in operation before the money subscribed is paid in. T. R. Gilmore, J. M. Garrett, C. Z. Montague, E. E. Parker and others of Huron are interested in the company.

The Youngstown Furnace Company, Youngstown, Ohio, have been incorporated with \$25,000 capital stock by Charles F. Ohl, C. E. Geschwind, Leon Geschwind, Frank H. Jennings, Louis H. Young and others. The company will manufacture hot air, hot water and steam furnaces for dwellings. For the present the work of manufacturing the goods will be done by contract.

The city of Gallon, Ohio, has brought suit against the Born Steel Range Company, Cleveland, to foreclose a mortgage for \$20,000. In 1891 the city erected a \$35,000 manufacturing plant, and it is claimed that in 1895 the Born Company, in order to gain possession and title to the plant, built a \$3000 addition and agreed for five years to pay out \$25,000 a year in wages, and gave their \$20,000 mortgage as guaranty. In 1898 the company had a controversy with the city and moved their plant back to Cleveland. The building was then turned over to the Gallon Wagon & Gear Company, and about two years ago it burned down. The gear company were made party defendants to the suit.

The C. O. Bartlett & Snow Company, Cleveland, Ohio, have received an order from the United States Geological Survey for one of their No. 3 style C four-compartment direct heat rotary dryers, to be used in the plant organized and located within the grounds of the Universal Exposition at St. Louis for testing the coals and lignites of the United States. Some of the large railroads, together with this department of the exposition, are erecting quite an extensive plant under the direction of the United

States Geological Survey for the purpose of demonstrating the most economical methods for utilizing coals, especially the lignite coals of Montana, the Dakotas and other of the Western States. This plant will be under the direction of E. W. Parker, J. A. Holmes and M. R. Campbell, and is the first of the kind ever authorized by the Government. It will be very valuable to all producers and users of coal.

McNab & Harlin Mfg. Company, 56 John street, New York, have enlarged their facilities for cutting and threading pipe to sketch by taking in the ground floor of the store adjoining their office.

The Cataract Electric Supply Company, Buffalo, N. Y., capitalized at \$100,000, have filed their certificate of incorporation. The directors are Nelson S. Hallett, Francis T. McDonald, Edwin B. Collister, Arthur R. Jenkins and Henry B. Lamson, all of Buffalo.

The East Broad Top Railroad Company, Orbisonia, Pa., are in the market for 25 miles of No. 8 and No. 9 B. & B. galvanized iron telegraph wire.

The Le Roy Plow Company, Le Roy, N. Y., who last fall rebuilt their plant on a much larger scale than before the fire, have found it necessary to still further increase their capacity, and have broken ground for additional buildings.

The American Ship Windlass Company, Providence, R. I., will rebuild the shops recently destroyed by fire. The new building will have the same ground area and about the same general capacity as the old shop.

A company have been organized at Piqua, Ohio, for the manufacture of a new steel harrow. Geo. E. Blaine of Toronto, Can., is at the head of the enterprise, which is capitalized at \$60,000.

W. F. Grower, Unity Building, Chicago, has purchased ground at the southwest corner of Madison street and the Chicago River, upon which will be erected a ten-story building, 100 x 110 feet, at a cost of about \$250,000. It is not probable that contracts will be let before the middle of June.

Contract for the manufacturing plant of the Cadillac Automobile Company, Detroit, has been let by Rogers & MacFarlane, architects, Detroit, Mich. The plant will be divided into eight separate compartments to be used for manufacturing, assembling, finishing, storage, power, &c. Buildings are to be erected with steel frame and tile roof and floors and completely equipped with automatic sprinklers. The plant will cost about \$200,000.

The Electric Construction Company have incorporated at Elkhart, Ind., for the purpose of manufacturing electrical specialties and installing electrical machinery. The directors of the new company, which are incorporated for \$25,000, are Brice H. Reid, Ernesto Sassenhoff, and Lloyd B. Hornbeck.

The Star Automobile Company have been incorporated at Buffalo, N. Y., with \$10,000 capital stock. D. R. Driscoll, C. E. Chalmers and Daniel Burgmaster are directors.

The Delphi Stone Crusher Company, Delphi, Ind., recently organized with \$50,000 capital, have elected the following officers: President, Frank W. Deilrow; vice-president and manager, Edward Bilder; secretary-treasurer, John Miller.

The American Tube Works, Somerville, Mass., are erecting a building for a packing room, and are making other improvements which in the aggregate will considerably increase the capacity of their plant. Other improvements have been contemplated, but the strike now on may cause the company to change their plans.

The Twyford Motor Car Company have been organized at Brookville, Pa., and will build a plant at that place for the manufacture of motor cars. Officers have been elected as follows: A. D. Deemer, president; W. N. Humphreys, vice-president; D. L. Taylor, secretary and treasurer, and R. E. Twyford, general manager. Mr. Twyford will have charge of the erection of the plant, which will begin at once.

The American Car & Foundry Company, Berwick, Pa., have received an order for 1000 cars from the Buffalo, Rochester & Pittsburgh Railway Company. Three hundred of the cars are to be steel hoppers, 400 gondolas, wooden construction, and 300 hopper coal cars, wooden construction.

A compromise of some of the most important claims against the Townsend-Downey Shipbuilding Company, New York, has been effected at a meeting between the referee and the creditors. Chief of these was the claim of the Luckenbach Towing Company, for \$28,400 growing out of their suit to recover penalties on their boat, which the Townsend-Downey Company were building. The claim was compromised for about \$13,000.

The Kings County Lighting Company, Brooklyn, N. Y., have been incorporated with a capital stock of \$2,000,000, by Ashley T. Cole, Charles T. Lark of Manhattan, Wm. J. Bagnell of Bayonne, N. J., and W. R. Fuller of Brooklyn. It is the intention of the company to engage in the gas lighting and electricity business in Kings and Queens counties.

The office of T. Guilford Smith, manager of sales at Buffalo of the Carnegie Steel Company, the Illinois Steel Company and the United States Steel Products Export Company, is now located at 203A Ellicott square.

CONTENTS.

	PAGE.
The Hudson River Tunnel.—I. Illustrated.....	1
The Belgian Steel Syndicate.....	5
Southwestern Copper Developments. Illustrated.....	6
Lake Ore for the Dominion Iron & Steel Company.....	9
The Monell Process at South Sharon.....	9
The Stoever 8-Inch Pipe Threading Machine. Illustrated....	10
The Stockbridge Electrically Driven Shaper. Illustrated....	12
St. Louis World's Fair Notes.....	13
The Shuster Wire Forming Machine for Large Shapes. Illus.	14
The De Laval Steam Turbine.....	16
The Bliss Bolt Head Trimming Press. Illustrated.....	17
A New Horizontal Drilling and Boring Machine. Illustrated..	18
The Bristol Thermometer-Thermostat. Illustrated.....	20
A New Sturtevant Hand Blower. Illustrated.....	20
The Landis Bolt Cutter. Illustrated.....	21
The Gould & Eberhardt Rack Cutting Machine. Illustrated..	24
A New Screw Cutting Bench Lathe. Illustrated.....	25
Different Applications of Steam Turbines. Illustrated.....	26
The Chicago Machinists' Strike.....	31
The Taylor-Newbold Metal Cutting Saw. Illustrated.....	32
Calibrating the Time Required by Jobs. Illustrated.....	33
Western Mesaba Iron Ore Explorations.....	34
The Fay & Scott Pattern Makers' Lathe. Illustrated.....	35
An Important Bankruptcy Decision.....	35
Editorial:	
The Merchant Marine Commission.....	36
Jug Handled Labor Agreements.....	37
Steam Railroad Control of Electric Lines.....	37
Easy to Find a Labor Grievance.....	37
Industrial Literature.....	38
Central American Notes.....	38
The National Eight-Hour Law.....	39
An Important Labor Decision.....	40
The Pennsylvania Shafting Company.....	40
Trade Publications.....	40
Obituary.....	41
New Publications.....	43
Manufacturing:	
Iron and Steel.....	44
General Machinery.....	44
Power Plant Equipment.....	44
Foundries.....	45
Bridges and Buildings.....	45
Boilers, Engines, &c.....	45
Hardware.....	45
Miscellaneous.....	45
The Iron and Metal Trades:	
A Comparison of Prices.....	47
Chicago.....	47
Philadelphia.....	49
Cincinnati.....	49
Cleveland.....	50
Birmingham.....	50
Pittsburgh.....	51
The Metal Trades Association.....	52
Personal.....	53
The History of the Thomas Iron Company.....	54
The Iron Wages Conference.....	55
The Mechanical Engineers.....	55
The Handlers' Union in Chicago.....	55
Labor Notes.....	55
New Publication.....	55
The New York Machinery Market.....	56
New York.....	58
Metal Market.....	58
The Chicago Machinists' Strike.....	58
Chicago Machinery Market.....	59
The Philadelphia Machinery Market.....	60
Iron and Industrial Stocks.....	61
Great Electric Locomotives for New York.....	61
Hardware:	
Condition of Trade.....	62
Notes on Prices.....	64
Trade Items.....	65
The Atlanta Conventions. Portraits.....	66
Richards Mfg. Company's New Plant.....	76
Price-Lists, Circulars, &c.....	76
Trade Winning Methods. Illustrated.....	76
The John Lucas & Co. First-Prize Paint Window. Illus...	77
Large Hardware Contracts Placed.....	77
British Letter.....	78
Miscellaneous Note:	
Rice's Adamant Cement.....	79
Double Barrel Hammerless Gun No. 370. Illustrated....	79
Relliance Ball Bearing Door Hanger. Illustrated.....	79
New Idea Double Acting Floor Spring Hinge. Illustrated.	80
Mayhew's Reamer and Riffler. Illustrated.....	80
New Jointed Rods. Illustrated.....	80
Machine Divided Tempered Steel Rules. Illustrated....	81
Vermont Safety Oil Can. Illustrated.....	81
One-Part Diamond Expansion Shield. Illustrated.....	81
Explosive Popgun and Pistol. Illustrated.....	82
N. F. O. Lubricant Gun. Illustrated.....	82
United States Mail Bank. Illustrated.....	82
Current Hardware Prices.....	83
Current Metal Prices.....	90

The Iron and Metal Trades

The apathy in the Iron and Steel trade is almost universal, and in the case of many producers has reached the point where an entire cessation of operations is being prepared for, by working up such raw material as is on hand and filling such orders as are still on the books. Resistance to a further decline is becoming more obstinate in those branches in which the market is open. Buyers seem almost unanimous in the opinion that values must crumble further, so that there is practically a deadlock. If sellers felt that concessions would bring out a good tonnage some of them might be more inclined to recede, but the conviction seems general that actual consumption could not be stimulated materially through such a course. There is the fear, too, that it might be difficult to check serious cutting if it were once entered upon.

Some of the merchant furnaces dependent upon lake Ores are beginning to see the end of their supplies, and unless there is an early change in the situation in lake transportation they will be forced to blow out. From the South come rumors of sales on the basis of \$9, Birmingham, for No. 2 Foundry, but they cannot be verified and must be received with caution. The amount of business being done is so moderate that the market has not been seriously tested.

In the Chicago district the flurry in Steel Billets, due to the offerings of surplus tonnage by a large new plant, appears to be over.

Reports from the Steel Rail trade are not very encouraging to the majority of the mills. Some of them are running very slow and have very few orders on their books. Some of the very low prices made lately for Light Rails were for export and not for the domestic market.

In the principal branches of Finished Iron and Steel the market is weaker. The only actual decline in price openly announced is that on certain sizes of Steel Pipe.

Some fair sized orders for Structural Material have been placed in the East and in the Central West.

Although quite a good volume of tonnage is coming out in Cast Iron Pipe, pretty low prices have been made lately, notably in the Eastern territory.

The price of Lead has been reduced, and there has been quite a quantity of Spelter placed in Pittsburgh at lower figures.

A Comparison of Prices.

Advances Over the Previous Month in Heavy Type,
Declines in Italics.

At date, one week, one month and one year previous.

June 1, May 25, May 4, June 3,
1904. 1904. 1904. 1903.

PIG IRON:

Foundry Pig No. 2, Standard, Philadelphia	\$14.50	\$14.50	\$15.00	\$19.50
Foundry Pig No. 2, Southern, Cincinnati	12.00	12.00	12.50	18.25
Foundry Pig No. 2, Local, Chicago	13.50	13.50	14.00	20.00
Bessemer Pig, Pittsburgh	13.35	13.35	13.85	19.85
Gray Forge, Pittsburgh	12.35	12.50	12.50	19.00
Lake Superior Charcoal, Chicago	15.00	15.00	15.00	24.00

BILLETS, RAILS, &c.:

Steel Billets, Pittsburgh	23.00	23.00	23.00	29.00
Steel Billets, Philadelphia	24.00	24.00	25.00	31.00
Steel Billets, Chicago	24.00	24.00	24.00	31.50
Wire Rods, Pittsburgh	30.00	30.00	30.50	37.00
Steel Rails, Heavy, Eastern Mill	28.00	28.00	28.00	28.00

OLD MATERIAL:

O. Steel Rails, Chicago	11.00	10.00	11.00	17.00
O. Steel Rails, Philadelphia	12.00	12.00	13.00	21.00
O. Iron Rails, Chicago	15.25	14.00	17.00	22.50
O. Iron Rails, Philadelphia	14.00	15.00	17.25	24.00
O. Car Wheels, Chicago	12.50	12.50	14.00	22.00
O. Car Wheels, Philadelphia	11.00	12.00	12.00	22.50
Heavy Steel Scrap, Pittsburgh	11.50	11.75	13.00
Heavy Steel Scrap, Chicago	9.50	9.50	10.00	16.50

FINISHED IRON AND STEEL:

Refined Iron Bars, Philadelphia	1.48½	1.48½	1.48½	1.85
Common Iron Bars, Chicago	1.35	1.35	1.45	1.75
Common Iron Bars, Pittsburgh	1.35	1.35	1.35	1.80
Steel Bars, Tidewater	1.49½	1.49½	1.49½	1.75
Steel Bars, Pittsburgh	1.35	1.35	1.35	1.60
Tank Plates, Tidewater	1.74½	1.74½	1.74½	1.80
Tank Plates, Pittsburgh	1.60	1.60	1.60	1.60
Beams, Tidewater	1.74½	1.74½	1.74½	1.73½
Beams, Pittsburgh	1.60	1.60	1.60	1.60
Angles, Tidewater	1.74½	1.74½	1.74½	1.73½
Angles, Pittsburgh	1.60	1.60	1.60	1.60
Skelp, Grooved Steel, Pittsburgh	1.40	1.40	1.35	1.90
Skelp, Sheared Steel, Pittsburgh	1.40	1.40	1.35	2.00
Sheets, No. 27, Pittsburgh	2.10	2.10	2.10	2.65
Barb Wire, f.o.b. Pittsburgh	2.50	2.50	2.50	2.60
Wire Nails, f.o.b. Pittsburgh	1.90	1.90	1.90	2.00
Cut Nails, f.o.b. Pittsburgh	1.75	1.75	1.75	2.15

METALS:

Copper, New York	13.00	13.00	13.37½	14.75
Spelter, St. Louis	4.65	4.90	5.00	5.50
Lead, New York	4.25	4.35	4.50	4.37½
Lead, St. Louis	4.17½	4.27½	4.40	4.15
Tin, New York	26.80	27.56	27.95	28.50
Antimony, Hallett, New York	7.00	7.00	7.25	7.00
Nickel, New York	40.00	40.00	40.00	40.00
Tin Plate, Domestic, Bessemer, 100 pounds, New York	3.64	3.64	3.64	3.99

Chicago.

FISHER BUILDING, June 1, 1904.—(By Telegraph.)

Encouraged by heavy mails received Tuesday and Wednesday of this week as a result of the days of holiday preceding, the trade here is feeling a little more optimistic than it has for some weeks past. The general sentiment seems to be that we are now standing firm on the bottom, and that the next move must be for the better. The buying movement on Pig Iron has not yet started, but sellers seem to be more decisive in their determination to go no lower than they were a week ago, and when the psychological moment comes when the buyer makes up his mind that nothing further is to be gained by waiting a buying movement will develop that will compensate to some extent for the extreme dullness of the last month or two. Already furnace representatives are notifying their trade that they cannot expect too much in the way of immediate deliveries or satisfactory railroad service, because when the buying movement begins the freight traffic will probably be greater than either the furnaces or railroads can care for immediately. Billets are in extremely poor demand at pool prices, though some business is being done by larger outsiders at whatever reduction below pool prices is necessary to close the sale. Rails and Structural Materials are extremely quiet as far as actual sales are concerned, though inquiry is better than it has been for several weeks. Plates continue to be in poor demand, and Sheets are but little better. Steel Pipe has been reduced in price by advancing one point in discounts on both Black and Galvanized in all sizes up to and including 6 inches, leaving the larger sizes of Steel Pipe and all sizes of Iron Pipe, both Black and Galvanized, unchanged. Old Materials show advances in a few lines, owing to an awakened demand, and a further decline in a number of lines because the demand

has not yet developed for such grades. The Coke situation is if anything more unsatisfactory than ever both to buyers and sellers, as the buyer has no guarantee that the bottom has been reached and the seller has no encouragement to offer. Metals are weak, with a $\frac{1}{4}$ c. decline in Copper. Wire products have fallen off in demand for immediate delivery, but there are indications that the fall demand will be excellent.

Pig Iron.—Indications in this market lead to the belief that the bottom price was reached on Southern Iron at \$9.25, Birmingham, for No. 2. At least, no evidence is at hand of offers below that price, and the producers representing by far the largest tonnage in the South are holding at \$9.50, and claim to be making sales at that figure. The buying movement has not begun in real earnest, and buyers are disposed to wait until the last moment before placing their orders, in the hope of securing a little better price. While there are signs of fluctuations on both Northern and Southern Irons, which might be taken as indications of their weakness or strength, according to the disposition of the reader of these signs, there is nothing sufficiently marked to warrant us in making any changes in prices on either grade of Iron, as compared with last week's figures. We, therefore, repeat last week's quotations without change, as follows:

Lake Superior Charcoal.....	\$15.00 to \$15.50
Northern Coke Foundry, No. 1.....	14.00 to 14.50
Northern Coke Foundry, No. 2.....	13.50 to 13.75
Northern Coke Foundry, No. 3.....	12.75 to 13.00
Northern Scotch, No. 1.....	14.25
Ohio Strong Softeners, No. 1.....	15.30 to 15.50
Ohio Strong Softeners, No. 2.....	14.80 to 15.05
Southern Silvery, according to Silicon.....	14.65 to 15.65
Southern Coke, No. 1.....	13.15 to 13.40
Southern Coke, No. 2.....	12.90 to 13.15
Southern Coke, No. 3.....	12.40 to 12.65
Southern Coke, No. 4.....	12.15 to 12.40
Southern Coke, No. 1 Soft.....	13.15 to 13.40
Southern Coke, No. 2 Soft.....	12.90 to 13.15
Southern Gray Forge.....	12.15 to 12.40
Southern Mottled and White.....	11.90 to 12.15
Malleable Bessemer.....	14.00 to 14.25
Standard Bessemer.....	15.30 to 15.80
Jackson County and Kentucky Silvery, 6 to 10 per cent. Silicon.....	16.30 to 18.30
Alabama Basic.....	13.15 to 13.40
Virginia Basic.....	14.40 to 14.65

Billets.—Apparently the new local Steel company have been able to book a considerable tonnage of Billets at whatever reduction they saw fit to make in order to secure the tonnage, for they are not as active in the market as they were a week ago. Meanwhile the members of the pool are holding up their prices to the old figure, nominally at least, which is as follows: Forging Billets, 4 x 4 and larger, \$24 per gross ton, Chicago, in carload lots; Axle Billets and Billets smaller than 4 x 4, \$25.

Rails and Track Supplies.—The situation is unchanged as compared with last week, and the buying movement is extremely sluggish. Standard Section Rails are unchanged at the \$28 basis, and Light Sections are offered at from \$23 to \$26 per ton, Chicago. Angle Bars are still quoted at 1.40c. to 1.50c., Spikes at 1.65c. to 1.75c., base, while Track Bolts have been reduced to 2.30c. to 2.35c., base, with Square Nuts, and 10c. to 15c. extra for Hexagon Nuts.

Structural Material.—No contracts of any magnitude have been placed, and the tonnage of pick up or car lot orders is rather less than last week. Prices are unchanged, both from mill and store, as follows: I-Beams and Channels up to and including 15 inches and Angles 3 inches on one leg and larger, 1.76 $\frac{1}{2}$ c., Chicago; Tees, \$1 per ton extra. Store prices on Structural are as follows: Angles, Beams, Channels and Zees, base sizes, 2c. to 2.10c.; Tees, 2.05c. to 2.15c., either random lengths or cut to lengths 5 feet and over.

Plates.—For Plates less than 60 inches wide the association price seems to be a matter of history rather than of actual practice, for there are a number of mills quoting reduced prices on narrow sizes. This is particularly true on Universal Mill Plates, which are sold \$3 and \$4 below the association price of 1.60c., Pittsburgh. Association prices are unchanged, as follows: Tank Steel, $\frac{1}{4}$ -inch and heavier, 1.76 $\frac{1}{2}$ c.; Flange Steel, 1.86 $\frac{1}{2}$ c.; Marine, 1.96 $\frac{1}{2}$ c.; Universal Mill Plate, 1.76 $\frac{1}{2}$ c. to 1.81 $\frac{1}{2}$ c.; 3-16 Tank, 1.86 $\frac{1}{2}$ c.; Nos. 7 and 8, 1.91 $\frac{1}{2}$ c. to 2.01 $\frac{1}{2}$ c.; No. 12, 2.01 $\frac{1}{2}$ c. to 2.06 $\frac{1}{2}$ c. Store prices are as follows: Tank Plate, 100 inches wide or less, $\frac{1}{4}$ -inch and heavier, 2c. to 2.10c.; 3-16 inch, 2.10c. to 2.15c.; Nos. 8 and 10, 2.10c. to 2.20c.; Flange quality, 25c. per 100 lbs. extra.

Sheets.—Nothing has developed that will warrant us in making any changes from prices quoted last week, although it is always necessary in publishing prices on Sheets to qualify the published figures with a statement that from \$1 to \$2 per ton below the figures named may be obtained on specifications that are considered desirable by the mills. It is also true that some business is being done at prices higher than quoted below, but in the midst of this uncertainty, due to the lack of cohesion on the part of the association interested in the sale of Sheets, the following prices may be taken as indicative of the ruling current quotations on carload lots, f.o.b. Chicago: One Pass Cold Rolled Blue Annealed, Nos. 9 and 10, 1.76 $\frac{1}{2}$ c.; Nos. 11 and 12, 1.86 $\frac{1}{2}$ c.; Nos. 13 and 14, 1.91 $\frac{1}{2}$ c.; Nos. 15 and 16, 2.01 $\frac{1}{2}$ c.; One Pass Cold Rolled Box Annealed, Nos. 18 and 20, 2.11 $\frac{1}{2}$ c.;

Nos. 22 and 24, 2.16 $\frac{1}{2}$ c.; Nos. 25 and 26, 2.21 $\frac{1}{2}$ c.; No. 27, 2.26 $\frac{1}{2}$ c.; No. 28, 2.36 $\frac{1}{2}$ c.; No. 29, 2.51 $\frac{1}{2}$ c.; No. 30, 2.61 $\frac{1}{2}$ c. Store prices remain unchanged, as follows: No. 8, 2.10c.; No. 10, 2.15c.; No. 12, 2.20c.; No. 14, 2.25c.; No. 16, 2.30c.; No. 18, 2.40c.; Nos. 20 to 24, 2.45c.; No. 26, 2.55c.; No. 27, 2.65c.; No. 28, 2.80c.; No. 29, 2.95c.; No. 30, 3.10c. Galvanized Sheets have experienced a reduction in prices, being now quoted at from 80 and 2 $\frac{1}{2}$ to 80 and 10 per cent. discount, with an occasional concession below this on large and desirable specifications.

Bars.—It may be said that the price of Bar Iron in carload lots, Chicago, is 1.35c. to 1.40c., base, half extras, the lower price being named on 100-ton lots and greater, and the higher price on ordinary car lots specifications. A Western car works bought a considerable tonnage, variously stated at from 2000 to 8000 tons, at better than 1.35c., but how much lower they were able to buy than that figure is not made public. In general the tone of the Iron market seems to be a little stronger than last week, with an awakening in demand that is encouraging. Steel Bars are unchanged at 1.51 $\frac{1}{2}$ c., Chicago, half extras, in carload lots, and better specifications were received last week than have been booked for nearly two months. The International Harvester Company, however, are offering Bars at \$1 to \$2 per ton below this figure. Nothing new has developed in the Hoop market, and business is seasonably quiet at 1.56 $\frac{1}{2}$ c. rate, half extras, f.o.b. Chicago, in carload lots. Store prices are unchanged, as follows: Iron Bars, 1.75c., base, full extras; Steel Bars, 1.70c. to 1.80c., base, half extras; Hoops, 2.10c. rates, full extras.

Merchant Steel.—A slight flurry of activity has become evident in this market, particularly on the part of implement manufacturers, who are asking for quick delivery of specifications of some magnitude. Prices remain unchanged, as follows: Open Hearth Spring Steel to the general trade, 2c. to 2.25c.; Smooth Finished Machinery Steel, 1.76 $\frac{1}{2}$ c. to 1.81 $\frac{1}{2}$ c.; Smooth Finished Tire, 1.71 $\frac{1}{2}$ c. to 1.76 $\frac{1}{2}$ c.; Sleigh Shoe, flat, 1.56 $\frac{1}{2}$ c. to 1.61 $\frac{1}{2}$ c.; Sleigh Shoe, concave and convex, 1.66 $\frac{1}{2}$ c. to 1.71 $\frac{1}{2}$ c.; Cutter Shoe, 2.25c. to 2.35c.; Toe Calk Steel, 2.06 $\frac{1}{2}$ c. to 2.11 $\frac{1}{2}$ c.; Crucible Tool Steel, 6 $\frac{1}{2}$ c. to 8c.; special grades of Tool Steel, 13c. and up; Shafting at 52 per cent. in car lots and 47 per cent. in less than car lots.

Merchant Pipe.—The leading producers of Pipe have reduced prices by increasing discounts on all sizes up to and including 6 inches in Black and Galvanized Steel pipe only, with a continuation of old prices on Wrought Iron Pipe on all sizes and on both Steel and Wrought Iron Pipe in the 7 to 12 inch sizes. This change in prices takes effect June 1:

	Steel Pipe.		Guar. Wrought Iron.	
	Black.	Galv.	Black.	Galv.
Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
$\frac{1}{4}$ to $\frac{3}{4}$ inch.....	67.35	57.35	64.35	54.35
$\frac{1}{2}$ inch.....	70.35	60.35	67.35	57.35
$\frac{3}{4}$ to 6 inches.....	84.35	64.35	71.35	61.35
7 to 12 inches.....	69.35	59.35	66.35	56.35

Boiler Tubes.—No improvement in the demand for Boiler Tubes is noted either from mill or store, and prices are unchanged, as follows:

	Steel.	Iron.	Seamless steel.
1 to 1 $\frac{1}{2}$ inches.....	43.35	40.80	53.35
1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ inches.....	55.85	38.35	40.35
2 $\frac{1}{2}$ to 3 inches.....	58.35	43.35	40.35
3 to 5 inches.....	64.35	50.85	48.35
6 to 13 inches.....	55.85	38.35

Store discounts are unchanged, as follows:

	Steel.	Iron.	Seamless steel.
1 to 1 $\frac{1}{2}$ inches.....	40	35	37 $\frac{1}{2}$
1 $\frac{1}{2}$ to 2 $\frac{1}{2}$ inches.....	50	32 $\frac{1}{2}$	35
2 $\frac{1}{2}$ to 5 inches.....	60	45	45
6 inches and larger.....	50	32 $\frac{1}{2}$

Cast Iron Pipe.—The only sale of any magnitude made by the leading producer in Cast Iron Pipe is one of nearly 7000 tons for the city of St. Louis just closed. Prices are unchanged, as follows: 4-inch Water Pipe, \$26, and 6-inch and heavier \$25, with \$1 extra for Gas Pipe.

Old Materials.—The difficulty in quoting current market prices on Old Materials is largely due to the fact that transactions are not sufficient in number or volume to make a steady market. For this reason in the list that follows we are advancing prices compared with last week on three lines, not because the general tone of the market is better, but because demand has developed for the lines which did not exist before. These advances amount to \$1.25 on Iron Rails, 50c. on Iron Axle Turnings and \$1 on Soft Steel Axle Turnings. Reductions have been made on the following lines: Old Steel Rails, short lengths, 50c.; Iron Fish Plates, \$1; Iron Car Axles, \$1; Steel Car Axles, 50c.; No. 1 Dealers' Forge, 50c.; No. 1 Mill, \$1; Country Sheet, \$1; Heavy Cast Scrap, 50c.; Stove Plate, 50c.; Railroad Malleable, 50c. We quote as follows, carload lots, per gross ton, Chicago:

Old Iron Rails.....	\$15.25 to \$15.50
Old Steel Rails, 4 feet and over.....	11.00 to 11.50
Old Steel Rails, less than 4 feet.....	9.50 to 10.00
Heavy Relaying Rails, subject to inspection.....	23.00 to 24.00
Heavy Relaying Rails, for side tracks.....	18.00 to 20.00
Old Car Wheels.....	12.50 to 13.00
Heavy Melting Steel Scrap.....	9.50 to 10.00
Mixed Steel.....	7.00 to 7.50

The following quotations are per net ton:

Iron Fish Plates.....	\$12.00 to \$12.50
Iron Car Axles.....	15.00 to 15.50
Steel Car Axles.....	13.50 to 14.00
No. 1 Railroad Wrought.....	10.50 to 11.00
No. 2 Railroad Wrought.....	8.75 to 9.25
Shafting.....	12.50 to 13.00
No. 1 Dealers' Forge.....	8.50 to 8.75
Wrought Pipe and Flues.....	7.50 to 8.00
Iron Axle Turnings.....	7.00 to 7.50
Soft Steel Axle Turnings.....	7.00 to 7.50
Machine Shop Turnings.....	6.00 to 6.50
Cast Borings.....	3.00 to 3.50
Mixed Borings, &c.....	3.00 to 3.50
No. 1 Mill.....	6.00 to 6.50
Country Sheet.....	5.00 to 5.50
No. 1 Boilers, cut to Sheets and Rings.....	7.50 to 8.00
Heavy Cast Scrap.....	9.50 to 10.00
Stove Plate and Light Cast Scrap.....	7.00 to 7.50
Railroad Malleable.....	8.00 to 8.50
Agricultural Malleable.....	7.50 to 8.00

Metals.—Nothing has happened thus far to give a better tone to the Metal market. On the contrary, Copper has fallen off $\frac{1}{4}$ c., making Casting quotable at 13c. and Lake at 13 $\frac{1}{4}$ c. Pig Tin is still quoted at 29 $\frac{1}{4}$ c. to 29 $\frac{3}{4}$ c. Pig Lead is now quoted at 4.30c. for 50-ton lots, with car lots at about 4.40c. and small lots at 4.60c. Spelter is now sold at from 5.05c. to 5.10c. for car lots and 5.25c. to 5.40c. for less than car lots. No change is noted in Sheet Zinc, which is quoted at 6.20c. for car lots of 600-lb. casks and 6.45c. to 6.50c. for less than car lots. Old Metals are dull, but unchanged in price. We quote: Copper Wire and Heavy, 11 $\frac{1}{4}$ c.; Copper Bottoms, 10c.; Copper Clips, 11 $\frac{1}{4}$ c.; Red Brass, 10c.; Red Brass Borings, 8 $\frac{1}{4}$ c.; Yellow Brass, Heavy, 7 $\frac{3}{4}$ c.; Yellow Brass Borings, 6 $\frac{1}{4}$ c.; Light Brass, 5 $\frac{3}{4}$ c.; Tea Lead, 3 $\frac{1}{2}$ c.; Zinc, 3.75c.; Pewter, No. 1, 17 $\frac{1}{2}$ c.; Block Tin Pipe, 22c.

Coke.—Now that the quantity of demurrage Coke on track, Chicago, is gradually becoming less, there has been a hope on the part of operators here that prices would advance, but just at the wrong moment rumors of a reduction of 40c. in freight rate on roads serving the Connellsville, New River and Pocahontas fields tend to unsettle the market and to delay buying. Such an agitation has been carried on for some time among the operators, who are keenly feeling the competition of the low freight rate from the ovens on the Louisville & Nashville, but whether the Pennsylvania and other roads leading into the other fields named will reduce their rate is problematical. Meanwhile 72-hour Foundry Coke is being sold in Chicago at from \$4.25 up, and Furnace Coke at about 75c. less.

Philadelphia.

FORREST BUILDING, May 31, 1904.

The Iron market during the past week has been one of the duller in many months. The national holiday may have had some influence, but apart from that there is a profound apathy in regard to new business. Well founded or not, there is a general expectation that prices are going to be lower, and as there appears to be no urgent need for material, purchases have been limited to the smallest quantities possible. The opening of the month may bring a little more business, not enough, perhaps, to establish any marked improvement, although it is hoped that it may be enough to hold the market steady pending later developments. There is little prospect of permanent improvement, however, during the next few weeks, and in the meanwhile efforts will be made to find a safe basis for prices. The uncertainties which have held the market in check for several weeks past are in no sense abated, while others have arisen which add further complications. Strikes in various sections of the country, and a general feeling of unrest, are a great obstacle to business, and as midsummer is almost at hand, there is a disposition to let things drift along, until something definite can be determined in regard to probable conditions during the last half of the year. There is certainly nothing very bright in the outlook, and it will be as much as should be expected if midsummer can be tided over without further setbacks. Consumption keeps up reasonably well, but the absence of new demand is disconcerting. The first half of the year has not been as bad as at one time seemed probable, and the same experience may be met with during the last half, but it is the uncertainty that hurts. Prices are nominally unchanged, but they show general weakness, and it is feared that if the demand does not improve, there may be more or less breaking away from quotations, which so far have been remarkably well maintained in many important lines. It is believed, however, that a rearrangement in nearly all departments is at hand, but how, when, and to what extent, is not apparent at the present time.

Pig Iron.—The market has been resting for a considerable time, and there is not much prospect of activity in the near future. Prices are steady, perhaps they are steadier than they would be if there was any demand, but as only small lots are taken, there is no necessity for changing quotations. Of course, good sized lots are taken once in a while, and it is surprising that even these bring fairly good prices, but there is such a feeling of indifference that very little effort is made either to buy or to sell. There is no money in it to producers at present prices, and consumers are not willing

to buy anything now that may, perhaps, be had at less money a few weeks later on, consequently there is nothing more than a hand-to-mouth market, and this is likely to continue until there is something definite, be it either better or worse. Inquiries are around for good sized lots, but whether they will materialize or not is uncertain. Some think that considerable tonnage will be placed during the next two or three weeks, while others believe that little will be done until well on in July. Opinions in regard to prices are rather wide apart, but the general idea is that they will rule lower before large orders can be secured. Buyers will probably have more to do with making prices than for a long time past, although there is no probability that sellers will be stampeded. Those who can meet buyers' terms will do so, those who cannot do it without loss will drop out of the race. This is the position to-day, and the chances are that it will continue. Alabama Irons will no doubt exercise considerable influence, to-day's prices for such being \$9.25 to \$9.50, f.o.b. furnace asked for No. 2 X Foundry, but \$9 is mentioned but not fully authenticated. The range of prices during the week for Philadelphia and nearby deliveries were about as follows:

No. 1 X Foundry.....	\$15.25 to \$15.50
No. 2 X Foundry.....	14.50 to 15.00
No. 2 Plain.....	14.00 to 14.25
Alabama No. 2, rail shipment.....	13.50 to 14.25
Alabama No. 2, on dock.....	12.75 to 13.25
Standard Gray Forge.....	13.50 to 13.75
Ordinary Gray Forge.....	12.75 to 13.00
Basic.....	13.75 to 14.00

Finished Material.—Business continues in a very unsatisfactory condition and all lines are feeling it. Orders are numerous, but the tonnage is so light that they make but little impression, so that the mills find it hard to keep the wheels moving with regularity. Business is not likely to improve much until after midsummer, and even then prospects are by no means assuring. One source of uneasiness is that the capacity for supply is increasing so rapidly. The present demand four or five years ago would have kept everything moving full, but under present conditions half to two-thirds is about all that can be utilized. Prices are unchanged, but the feeling is not strong, and there is an impression that a complete readjustment may be necessary in the not very distant future. Buyers are probably holding off to see what the outcome will be, but there should be a good deal of business placed before the end of the month. It is hardly necessary to quote prices in detail, as they are in all respects the same as during the past several weeks.

Old Material.—There is no improvement to note in this department. Prices are weak, but have got to a point that if there is any demand at all, they ought to stiffen considerably, but at present buyers appear to have lost all interest in the market. The following figures fairly represent buyers' and sellers' ideas for deliveries in buyers' yards:

No. 1 Steel Scrap.....	\$12.00 to \$12.50
Low Phosphorus Scrap, nominal.....	16.00 to 17.00
Old Steel Axles.....	15.00 to 16.00
Old Iron Rails.....	15.00 to 15.50
Relaying Rails.....	20.50 to 21.50
Old Iron Axles.....	17.00 to 18.00
Old Car Wheels.....	12.00 to 12.50
Choice Scrap, R. R. No. 1 Wrought.....	13.50 to 14.50
Yard Scrap.....	12.50 to 13.00
Machinery Scrap.....	12.50 to 13.00
No. 2 Forge Fire Scrap.....	10.50 to 11.00
No. 2 Forge Fire Scrap (Ordinary).....	9.00 to 10.00
Wrought Turnings.....	8.50 to 9.00
Axle Turnings, Choice Heavy.....	10.00 to 10.50
Cast Borings.....	6.50 to 6.75
Stove Plate.....	9.00 to 9.50
Wrought Iron Pipe.....	10.00 to 11.00

Cincinnati.

FIFTH AND MAIN STS., June 1, 1904.—(By Telegraph.)

Pig Iron.—The market during the past week has shown a somewhat brighter aspect, and while it is true there is no special buying movement being brought forward, surface indications all point to the fact that a healthier tone prevails. There are rumors of some Iron being sold on a \$9, Birmingham, basis, but if such is the case it is impossible to verify it. Most of the Southern furnaces have apparently decided that Iron is now as low as it should go, and are very unwilling to make any further reduction. Northern furnaces have apparently decided to settle on a \$12 basis and are holding firm at this figure. There has been some buying done for immediate necessities, but the larger orders that have been expected for last half delivery are very slow in assuming shape. There have been a few inquiries received during the week, several of which look very promising. Among these we mention 1000 tons of Nos. 2 and 3 for the Westinghouse people, Allegheny City delivery; 1700 tons of Nos. 2 and 3, and some Gray Forge for Standard Sanitary Mfg. Company, Louisville, and 2500 tons for a Newark, Ohio, Stove concern. The Massillon Iron & Steel Company, who were in the market for about 12,000 tons, have placed an order for 1000 tons of this amount, for June shipment, reported to have been purchased on \$9.25, Birmingham, basis. The foundry people are very quiet, while the Pipe company are rushed with orders and are taking considerable Iron. One large seller reports to-day contracting for several thou-

sand tons of Nos. 3 and 4 on a \$9.25 basis, Birmingham. Freight rates from Hanging Rock district to Cincinnati, \$1.15, and from Birmingham, \$2.75. We quote, f.o.b. Cincinnati, as follows:

Southern Coke, No. 1.....	\$12.50 to \$12.75
Southern Coke, No. 2.....	12.00 to 12.25
Southern Coke, No. 3.....	11.50 to 11.75
Southern Coke, No. 4.....	11.00 to 11.25
Southern Coke, No. 1 Soft.....	12.50 to 12.75
Southern Coke, No. 2 Soft.....	12.00 to 12.25
Southern Coke, Gray Forge.....	10.75 to 11.00
Southern Coke, Mottled.....	10.50 to 10.75
Ohio Silvery, No. 1.....	15.65 to 16.15
Lake Superior Coke, No. 1.....	13.15 to 13.65
Lake Superior Coke, No. 2.....	12.65 to 13.15
Lake Superior Coke, No. 3.....	12.15 to 12.65

Car Wheel and Malleable Irons.

Standard Southern Car Wheel.....	\$16.25 to \$16.75
Lake Superior Car Wheel and Malleable	15.50 to 16.30

Coke.—Shipments are small, buyers only securing enough for present needs. Prices are about the same as last week, with very few sales recorded. We quote, f.o.b. ovens, Connellsville, \$1.75 to \$2.

Plates and Bars.—The Bar trade is slightly more active, but Structural Iron, usually quite in demand at this season of the year, is very quiet. We quote, f.o.b. Cincinnati: Iron Bars, in carload lots, 1.40c., with half extras; the same in smaller lots, 1.70c., with full extras; Steel Bars, in carload lots, 1.48c., with half extras; the same in smaller lots, 1.80c., with full extras; Base Angles, 1.73c. in carload lots; Beams and Channels, in carload lots, 1.73c.; Plates, 1/4-inch and heavier, 1.73c., in carload lots; in smaller lots, 2c.; Sheets, 16-gauge, in carload lots, 2.05c.; in smaller lots, 2.60c.; 14-gauge, in carload lots, 1.95c.; in smaller lots, 2.50c.; Steel Tire, 3/4 x 3-16 and heavier, 1.68c., in carload lots.

Old Material.—Dealers are complaining at the lifeless tone that exists in this class of material. There is scarcely anything doing, and the future looks anything but bright. We quote dealers' prices, f.o.b. Cincinnati, as follows: No. 1 Railroad Wrought Scrap, \$11 to \$11.50 per net ton; No. 1 Cast Scrap, \$9.25 per net ton; Iron Rails, \$14.50 per gross ton; Steel Rails, rolling mill lengths, \$11 to \$11.50 per gross ton; Iron Axles, \$15 per net ton; Car Wheels, \$11 to \$11.50 per gross ton; Heavy Melting Scrap, \$11.50 per gross ton; Low Phosphorus Scrap, \$11.50 to \$12 per gross ton.

Cleveland.

CLEVELAND, OHIO, May 31, 1904.

Iron Ore.—The Ore situation has not changed materially during the past week. The lake situation seems still to be the center of interest in Iron Ore affairs, inasmuch as the movement of Ore down the lakes cannot be resumed until the lake labor difficulty has been settled. The only move in the direction of an improvement there has come through the offers on the part of the Cleveland branch of the Civic Federation of its services as an intermediary for the contending interests. This offer has not been accepted as yet, but it is more than likely that it will be. The Ore producers have received some new inquiries for their material, indicating that the consumers are about ready to come in and cover their needs. They have not bought very largely as yet, although there are some reports of current sales. The amounts have not been mentioned. It is now generally conceded that the basic prices are to be \$3.25, f.o.b. lake ports, for Bessemer Old Range and \$3, f.o.b. lake ports for Bessemer Mesaba. This is a material reduction from the prices which had been tacitly agreed upon at the New York meeting. It is now understood that the other grades of Ore will be scaled on these prices.

Pig Iron.—The buying of Foundry Pig Iron is not very active. The consumers still show a tendency to cover their immediate needs, but further than that they are not disposed. In some quarters the buyers are disposed, if the producers will consent, to cover their needs for a year ahead, at current prices. Such inquiries have been made of a number of the furnacemen, but so far the latter have refused to consider such a proposition. There has been nothing as yet in the way of buying for second half. In some quarters there has been a good demand for Malleable, this emanating from the concerns producing agricultural machinery. In fact, that market has been stronger than any of the other lines of trade. Malleable is quoted about \$12.50 in the Valleys. We quote Pig Iron prices, f.o.b. Cleveland, as follows:

Northern Coke, No. 1 Foundry.....	\$14.00 to \$14.50
Northern Coke, No. 2 Foundry.....	13.50 to 13.75
Northern Coke, No. 3 Foundry.....	13.00 to 13.50
Southern Coke, No. 1 Foundry.....	13.85 to 14.10
Southern Coke, No. 2 Foundry.....	13.60 to 13.85
Southern Coke, No. 1 Soft.....	13.85 to 14.10
Southern Coke, No. 2 Soft.....	13.60 to 13.85
Jackson County, 8 per cent. Silicon.....	to 23.45
Lake Superior Charcoal.....	17.00 to 17.50

Finished Iron and Steel.—The trade in this territory is now willing to admit for the first time that business is extremely dull. The peculiarity of the demand from Cleveland consumers has kept the market strong for certain lines of trade. The finishing mills of this territory have had a

good run of orders or have had a good business on old contracts, but it is now evident that some of these concerns are feeling a slackening of the pace of business, and this is having a direct influence upon the Iron market here. The past two weeks have constituted a period of unusual quietness. Bars, Pipes and Bands have been the strong feature from this territory for months. The demand for Bars has eased off quite perceptibly. The principal cause of the easier conditions is, of course, the lack of specifications from the agricultural implement works. The demand for Bands and Hoops has eased also, and the market shows a downward tendency, the quotation of 1.40c., Pittsburgh, being nominal. The Sheet trade also shows a distinct tendency toward dullness. The market has been spasmodic to a greater or less extent and has shown tendencies toward spurts. Lately, however, there has been a letting down all along the lines, and the results have not been at all gratifying to the trade. The prices hold nominally as they have been, being shaded, however, more than ever by the small mills, in the interest of better business. The Structural trade is about at a standstill and Plates are sharing the same general tendency. It is now reported, however, without authority, that some of the smaller mills are willing to shade the association list on these materials, but this is not confirmed, and no sales have been reported here at a cut. The old story of a reduction in Billet prices is resumed with earnestness, but is not easily confirmed, except by the appearances, the association mills seeming to lack orders, while some of the smaller ones appear to be fairly well supplied.

Old Material.—The market has been easy, very little business being done. In some quarters there are reports of a still greater shading of prices than has been recently reported. This is due to the necessity of some holders finding a market quickly for their material. We revise and quote all gross tons: Old Steel Rails, \$12; Old Car Wheels, \$12; Heavy Melting Steel, \$12. All net tons: Cast Borings, \$4 to \$4.50; No. 1 Busheling, \$10.50 to \$11; No. 1 Railroad Wrought, \$11.50 to \$12; Wrought Turnings, \$6.50 to \$7; Iron Car Axles, \$16 to \$17; No. 1 Cast, \$11; Stove Plate (nominal), \$7.50 to \$8.

Birmingham.

BIRMINGHAM, ALA., May 29, 1904.

During the past week the Iron market simply dragged its slow length along, the variations being few. Barely enough Iron changed hands to establish quotations. Judging the market by existing conditions, the immediate outlook is not encouraging. But there is no demoralization. Sellers are not taking the initiative in the lowering of prices, but have reluctantly accepted bids from buyers and pocketed their disappointment with the best grace they could command. There is a good deal of dissatisfaction and disappointment over the trend of the market, and the decline has been fought stubbornly. But the buyers of Iron have been so successful in forcing lower values that they are encouraged to hold off a while longer, with the expectation that the market, as long as it is devoid of their support, will be a constantly sagging market, tending to lower values.

A close observer of the market could not fail to note that during the latter half of the past week the inquiry was somewhat freer, but the bar to business was the refusal of the selling interests to accept the prices named by the buyers. As stated in previous letters, reports from selling agents indicate that many buyers are waiting for the market to get on the basis of \$9 for No. 2 Foundry before taking on any line of moment. If the market isn't on that basis now, it is pretty close to it, and it appears as if the thumbscrew of depression needs only another twist to bring the market to buyers' views. The one ray of light that encourages the more optimistic in the Iron trade to hope for a recovery of values is the action of the Northern furnace interests in decreasing furnace output by the closing down of a sufficient number to equalize the supply and demand features of the trade. In this district there is no evidence yet of intentions as to this feature. We already have a very material number of our furnaces out of commission, with a very poor prospect of their being blown in again in the near future.

It has been a hard matter to obtain reliable information as to sales. Sellers seem reluctant to impart it, each as far as he is concerned, but nearly all of them have heard of some transaction by a neighboring competitor. So a good deal of the information obtained is of a hearsay character. A few lots were entered for the third quarter, but they were of no significance. The values for this delivery were generally on the basis of \$9.50 for No. 2 Foundry. There were a few sales, restricted in volume, of No. 1 Foundry at \$10.25, and there were sporadic sales of No. 2 Foundry at \$9.75. There were some sales also at \$9.50, and there were some sales made at \$9.25 by parties who quoted prices at \$9.50. A very strong intimation was given your correspondent that, with a desirable order, \$9 for No. 2 Foundry could be worked. But that is only opinion, based on the apparent condition of the market. No. 3 Foundry is quoted at \$9, but there is very little doubt about its being had for less. No. 4 Foundry and Gray Forge are vacillating

between \$8 and \$8.25, with inquiry at the lower values. There were no sales reported. Nor were there any sales reported of Basic Iron. On such a market as exists at present it is simply impossible to give exact figures for a guide as to actual conditions. For reasons that concern only the seller he is loath, not infrequently, to make public his transactions, and many of them leak out only when the news can be rated as stale news.

Information comes to your correspondent direct from the leading interest to the effect that they worked an export order for several hundred tons the past week, and could have had it run into the thousands had ocean freight room been available. Your correspondent made every effort to ascertain the destination of the order, without success. Nor could he persuade the seller to share his confidence as to the amount of the shipment. The price was stated to be above the selling value of the home market. There have been of late not infrequent cables exchanged as to the value of Iron, but no other interest has yet reported any success in fishing for this business. If prices have declined to an export basis, it is a question of only a little while to the setting in of domestic buying.

The Seaboard Air Line Railroad has let the contract for a depot building in this city to cost about \$20,000, on which work will commence at once.

The Woodward Iron Company have asked for bids for the erection of 300 coke ovens on their property, to be completed this year, and the Sayre Mining & Mfg. Company are building 200 Coke ovens at Vulcan on the Cane Creek branch of the Louisville & Nashville Railroad, lately completed.

Pittsburgh.

PARK BUILDING, June 1, 1904.—(By Telegraph.)

Pig Iron.—The inquiries of United States Cast Iron Pipe & Foundry Company for a large tonnage of Forge and Foundry Iron to cover contracts for Cast Iron Water Pipe for Cincinnati and other cities secured by this concern and also of the Massillon Iron & Steel Company for 12,000 tons of Forge and Foundry for June, July and August shipment are creating some stir in the Pig Iron market, and a number of furnaces are figuring on this business. There is not much doing in Bessemer Iron, and it is held at \$12.50, Valley, or \$13.35, Pittsburgh. We note a sale of 1000 tons to a local Steel concern at that price for June shipment. Basic Iron is in fair request, and is held at about \$12, Valley, or \$12.85, Pittsburgh. Northern No. 2 Foundry is held at \$12.15 to \$12.25, Valley, or \$13 to \$13.10, Pittsburgh. We note a sale of 1000 tons at the first named price, and sales of several small lots, aggregating 800 to 900 tons, at \$13.10 to \$13.25, Pittsburgh. Northern Forge Iron is held at \$12.50, Pittsburgh, but several consumers state they have been offered Forge at \$12.35, Pittsburgh. Southern No. 2 Foundry is held by the leading interest at \$9.50, Birmingham, but on a firm offer and for any considerable tonnage it is probable that \$9.25 would be accepted by several of the Southern furnace companies, based on \$9.25, Birmingham, for Southern No. 2; this would mean \$13.60, Pittsburgh, which is a prohibitory price, as Northern No. 2 is quoted at \$13, Pittsburgh. A number of furnaces in the two Valleys are getting ready to blow out between now and July 1 in preference to piling any more Iron.

Steel.—The Steel market is quiet, and there seems to be no longer any doubt that official prices on both Billets and Bars are being shaded. Several of the large Steel interests are actively seeking tonnage in Sheet Bars in the open market that heretofore have sold practically their entire output to Sheet and Tin Plate mills of constituent interest.

(By Mail.)

General conditions in the Iron trade continue very quiet, but in the past week there has been a good deal of inquiry come up for Nos. 3 and 4 Foundry Iron and also for Northern and Southern Forge. The United States Cast Iron Pipe & Foundry Company expect to secure the contract for the Cincinnati Water Works, and if they get it, will need upward of 60,000 tons of Foundry and Forge Iron. Most of this will be Nos. 3 and 4 Foundry and the balance Forge. The concern have bought within the past month a heavy tonnage of Forge and Foundry and have inquiries in the market to-day for upward of 60,000 tons. The Massillon Iron & Steel Company, operating a Cast Iron Pipe foundry at Massillon, Ohio, are in the market for about 12,000 tons of No. 3 Foundry and Forge for June, July and August shipment. Aside from these inquiries there is very little doing in the Pig Iron market. The Wheeling Mold & Foundry Company, who have a contract for 30,000 tons or more of Castings for the New York tunnel, have inquiries out for a heavy tonnage of Iron to cover this contract and have received a large number of tenders, but have not yet bought. There seems to be more demand for Forge Iron than for Bessemer and Foundry, although there is a fair inquiry for the latter. The only sale of Bessemer reported during the week was one of 1000 tons made to a local Steel concern on the basis of \$12.50, Valley furnace.

The Steel market continues quiet and there seems to be no doubt but that official prices on both Billets and Sheet Bars are being shaded. The demand for Finished Iron and Steel continues quiet, and on some lines controlled by price agreements it is intimated that official figures are being shaded. This applies particularly to Steel Bars and Plates, and sales of the latter at prices considerably below association figures are reported. The railroads continue to buy very sparingly, and it is evident intend to pursue this policy for the next several months at least. In the Finished Iron and Steel market two items of interest are the reported securing of contracts for about 25,000 boxes of Coke Plates by the American Sheet & Tin Plate Company for Canadian canners. This business heretofore has all gone to Wales, and the entrance of the leading interest into the Canadian market is significant. The reported placing of at least a portion of 200 miles of 12 and 16 inch Line Pipe for a natural gas line, to be laid to Kansas City and Joplin, Mo., is also of interest.

The month of June will likely see the blowing out of a number of blast furnaces in the two Valleys and some stacks in the Pittsburgh district. Of the 34 blast furnaces in the two Valleys 25 were active last week and 9 were idle, as follows: Active—Independent stacks, 16; Steel Corporation, 6; Republic Iron & Steel Company, 3. The idle stacks were as follows: Independent furnaces, 4; Steel Corporation, 4; Republic Iron & Steel Company, 1. A number of stacks in the Valleys are running to use up their last year's Ore supply, and as soon as this is done will blow out, unless the demand for Pig Iron improves very materially in the meantime.

Ferromanganese.—There is not much inquiry and we quote the best grades of domestic and English Ferro at \$41.50 to \$42, delivered, for carload lots.

Muck Bar.—The market continues very quiet and is practically bare of inquiries. Best grades of Muck Bar made from all Pig Iron are held at \$25 to \$25.50, Pittsburgh. Eastern makes of Muck Bar are being offered in this market at considerably less prices.

Wire Rods.—Demand for Wire Rods has quieted down a good deal, due to the falling off in tonnage in Wire products. We quote Bessemer and Open Hearth Rods at \$30, Pittsburgh, but on a firm offer this would probably be shaded.

Skelp.—The demand for Skelp is very active, due to the fact that the Pipe mills are pretty well filled up and are regular buyers in the market. We quote Grooved Iron Skelp at 1.45c. to 1.50c.; Sheared, 1.50c. to 1.55c., and Grooved and Sheared Steel Skelp at 1.40c., Pittsburgh.

Steel Rails.—Several contracts for Steel Rails for local traction lines have been placed in the past week, amounting to 4000 to 5000 tons. The local mill is reported to have taken a contract for about 20,000 tons for Western roads. The general market, however, is quiet. We quote Standard Sections at \$28, the mills equalizing freights. Light Rails continue to sell at low prices, 30 to 45 lb. having been sold recently as low as \$21, maker's mill.

Structural Steel.—The American Bridge Company took a contract last week from the Cincinnati Southern Railroad for about 2200 tons of Steel, to be used on the Queen & Crescent division. Local contracts including viaducts for the Wabash Railroad, the Gazette building and several smaller jobs have not yet been closed. Tonnage booked in May by the leading interest and outside Structural concerns compares very favorably with previous months. We quote: Beams and Channels, up to 15-inch, 1.60c.; over 15-inch, 1.70c.; Angles, 3 x 2 up to 6 x 6, 1.60c.; Zees, 1.60c.; Tees, 1.60c.; Steel Bars, 1.60c., half extras, at mill; Universal and Sheared Plates, 1.60c.

Plates.—There is no improvement in demand for Plates, consumers still buying in small lots for actual needs. Reports of unevenness in prices of Plates are current, but these are denied by the mills. It is claimed, however, for some recent tonnage placed full official prices were not obtained. It is probable that cutting in prices is being done mostly by mills outside the agreement, and on gauges lighter than ¼ inch. Official prices are as follows: Tank Plate, ¼-inch thick and up to 100 inches in width, 1.60c., at mill, Pittsburgh; Flange and Boiler Steel, 1.70c.; Marine, A. B., M. A., and ordinary Fire Box, 1.80c.; Still Bottom, 1.90c.; Locomotive Fire Box, not less than 2.10c., and up to 3c.; Plates over 100 inches to 110 inches in width, not less than 5c. per 100 lbs. extra; Plates over 110 inches to 115 inches wide, not less than 10c. extra; Plates over 120 inches to 125 inches wide, not less than 25c. extra; Plates over 125 inches to 130 inches wide, not less than 50c. extra; Plates over 130 inches wide, not less than \$1 extra; Plates 3-16 inch in thickness, \$2 extra; gauges Nos. 7 and 8, \$3 extra; No. 9, \$5 extra. Above prices are on carload lots, f.o.b. at mill, Pittsburgh, with 5c. extra for less than carload lots; terms, net cash in 30 days, and for all points of delivery in the United States except the Pacific Coast.

Sheets.—Demand for Sheets is fairly active, some of the leading mills being well sold up to August. It is understood that the leading interest are operating to about 75 per cent.

of their capacity. Prices of Sheets are fairly firm, but on Galvanized are being slightly shaded to the extent of about 2½ per cent. for desirable specifications. We quote as follows: No. 26 Black Sheets, box annealed, one pass through cold rolls, 2.05c. to 2.10c.; No. 27, 2.10c. to 2.15c., and No. 28, 2.20c. to 2.25c., f.o.b. at mill, for carload lots. Galvanized Sheets are held at 2.85c. for No. 26, 3.04c. for No. 27 and 3.23c. for No. 28, in carload lots, for ordinary specifications. As noted above, our prices on Galvanized Sheets and on Black as well are being slightly shaded for very desirable orders.

Bars.—A fair amount of tonnage is being placed in Iron and Steel Bars, but is not large enough to give the mills full work. Several of the leading Bar concerns have continuous Bar mills, which can turn out an enormous tonnage, and these are not being operated to full capacity. The official prices on Steel Bars are being adhered to by the mills in the association, but there are several outside mills who are shading these prices about \$1 a ton. The amount of tonnage, however, that can be taken care of by such mills is very small, and does not cut much figure in the general market. We quote Iron Bars at 1.35c. to 1.40c., Pittsburgh, and Steel Bars at 1.35c., Pittsburgh, in carload and larger lots, with the usual differentials for less than carloads. On Open Hearth Bars \$1 a ton advance is charged.

Hoops and Bands.—New tonnage being placed is relatively small, but the mills are fairly busy on contracts. We quote Steel Hoops at 1.40c. and Steel Bands at 1.30c. to 1.35c., extras as per Steel card.

Merchant Pipe.—The demand for Merchant Pipe is not as active as it has been, but the mills are quite busy on contracts. The demand for the larger sizes of Pipe, ranging from 6 inches up to 16 inches in diameter, is very active, and a good deal of work is in sight. Among this is a large natural gas line for conveying natural gas to Kansas City for domestic and manufacturing uses, and to Joplin, Mo. This line will take about 125 miles of 16-inch Line Pipe and about 100 miles of 8-inch to 12-inch, or about 15,000 tons in all. This inquiry has been on the market for about six months. It is being negotiated for by interests connected with the Pittsburgh Oil & Gas Company and the Union Natural Gas Company, both local concerns. Pittsburgh basing discounts on Merchant sizes of Steel Pipe have been reduced one point and are now as follows:

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
	Per cent.	Per cent.	Per cent.	Per cent.
1½, 2 and 3 inch.....	69	59	66	56
3½ inch.....	72	62	69	59
3½ to 6 inches.....	76	66	73	63
7 to 12 inches.....	71	61	68	58
Extra strong, plain ends.				
¾ to 8 inches.....	68	58	64	54
Double extra strong, plain ends, ¾ to 8 inches.....	60	50	56	46

Boiler Tubes.—Demand for Boiler Tubes is only fairly active, and there is considerable cutting in prices, tonnage not being large enough to give all the mills full work. Consumers' discounts on carloads, which are more or less shaded, are as follows:

	Steel.	Iron.
1 to 1¼ inches.....	42½	39
1¾ to 2¼ inches.....	55½	38
2½ inches.....	58	43
2¾ to 3 inches.....	64½	50½
6 to 18 inches.....	53½	38

Merchant Steel.—Trade is quiet, as it usually is at this season of the year, but specifications on contracts are coming in at a fairly satisfactory rate. Demand for Shafting is fairly active, and agreed prices are, in the main, being held. We quote: Hexagon Steel Bars, 1.60c. for Bessemer and 1.65c. for Open Hearth; Plow Slabs, ¾-inch and heavier, 1.65c.; Tire Steel, smooth finish, ¾ x 3-16 and larger, 1.65c., flat; Plow Steel, 6 inches and under, 1.40c. for Bessemer and 1.45c. for Open Hearth; Carriage Spring Steel, 1.75c.; Railway Spring Steel, 500 tons and over, 1.60c.; carloads, 1.65c.; Small Angles, Channels and Tees, under 3 inches on either leg, 1.45c., base; Toe Calk, 1.85c. to 1.90c. Shafting is held at 52 per cent. off in carloads and 47 per cent. in less than carloads, delivered in base territory.

Tin Plate.—Reports are that the American Sheet & Tin Plate Company have invaded the Canadian market and have taken contracts for about 25,000 boxes for shipment to the canners in that country. This business formerly all went to Wales, and the fact that at least part of it has been taken by American mills indicates a new source of outlet for Tin Plate made in this country. Domestic demand for Tin Plate is active, and it is understood the leading interest is getting specifications at a rate that keeps all their plants in operation to utmost capacity in order to get out Plate as fast as wanted by consumers. A number of independent Plate mills have already received their specifications for June and July shipments and have been compelled to turn away business on which prompt deliveries were wanted. The Tin Plate trade could hardly be more active than it is at

the present time. We quote 100-lb. Cokes at 3.40 per box, Pittsburgh.

Spelter.—Prices of Spelter suffered a sharp decline last week, and as a result sales in this district were heavier than for some weeks past. We note sales of 1700 to 1800 tons of Prime Western Spelter in last week at prices ranging from 4.80c. to 4.85c., Pittsburgh. The market is slightly lower today, and we quote best grades of Western Spelter at 4.78½c. to 4.80c., Pittsburgh.

Iron and Steel Scrap.—The Scrap market is practically lifeless as far as new business is concerned, and prices are largely nominal. The best grades of Heavy Melting Stock have been offered at \$11.50, and lower in gross tons without finding buyers. No. 1 Wrought Scrap is \$12.50 to \$12.75, net tons; Malleable Scrap, \$11.50 to \$11.75, gross tons; Turnings, \$7.25 to \$7.50, gross tons; Cast Iron Borings, \$5.50 to \$5.75, gross tons; Bundled Sheet Scrap, \$9 to \$9.25, gross tons, all f.o.b. Pittsburgh.

Coke.—The prospect that a number of blast furnaces in the Pittsburgh and Valley districts will have to blow out in the near future is having the effect of weakening prices on Furnace Coke, and we are advised that strictly Connellsville Furnace Coke has sold in the past week as low as \$1.50 a ton, at oven. A good deal of Furnace Coke is moving, however, at \$1.60 to \$1.65 per ton on contracts made some time ago. Prices of Foundry Coke are also easier, and strictly Connellsville 72-hour grades are selling as low as \$1.90 to \$2 to consumers. Mountain Coke, which is not quite as high in quality as Connellsville, is selling as low as \$1.40 for Furnace and \$1.75 for Foundry. Output last week in the Upper and Lower Connellsville region was about 265,000 tons, a slight decrease as compared with the previous week.

The Metal Trades Association.

(By Telegraph.)

CINCINNATI, OHIO, May 31, 1904.—The special session of the Administrative Branch of the National Metal Trades Association opened here yesterday morning and closed to-day at 6 p.m. The meeting was held behind closed doors and only members were admitted. Those present were: H. N. Covell, New York, president; J. W. Gardner, Quincy, Ill., first vice-president; W. D. Sayle, Cleveland, Ohio, second vice-president; Fred A. Geir, Cincinnati, treasurer; E. F. Dubrui, Cincinnati, commissioner; Robert Wuest, secretary; O. B. Kinnard, Minneapolis, Minn.; A. Falkenau, Philadelphia, Pa.; C. E. Hildreth, Worcester, Mass.; George F. Stedman, St. Louis; M. H. Barker, Boston, Mass.; P. B. Kending, Seneca Falls, N. Y., and F. K. Copeland, Chicago, Ill.

The question of the machinists' strike at Chicago was under discussion, and it was decided that if found necessary Commissioner Dubrui or Secretary Wuest would establish an office temporarily in Chicago to conduct the employers' side of the strike. The employers are forcing the situation and the local association has voted \$100,000 for its own purposes. The employers take the position that the men must do struck work or quit. It is estimated that about 9000 men and 100 shops will be affected. The strike is expected to be in full force on Wednesday, June 1.

The National Association will send men to Chicago as soon as word is received from the Chicago District Committee to that effect. The Chicago Employers' Association is to look after the enforcement of the laws, such as prosecution for assault, &c., while the Chicago Metal Trades Association will look after the injunction and furnish special police guards, &c., for the plants.

At Youngstown, where the machinists have demanded a certain method of reduction, their demands are in excess of what the employers want. The employers have reduced some and not others, averaging about 3 per cent. of the total pay roll, while the machinists demand a general reduction on all men and are willing to accept a 4 per cent. reduction of their entire pay roll. The Administrative Council resolved that this was a matter of shop management.

Support was voted the Ruemmel-Dawley Company of St. Louis in the boiler makers' strike for a closed shop, with the demand that two boiler makers be employed at all air hammers instead of a boiler maker and helper as heretofore. A committee, consisting of W. D. Sayle, Cleveland; F. K. Copeland, Chicago; A. Falkenau, Philadelphia; C. E. Hildreth, Worcester, and O. B. Kinnard,

Minneapolis, was appointed to take up the plan and scope of the association and devise ways and means of securing the co-operation of other associations whereby much duplicate work and expense can be eliminated. The recommendation was that this committee call for a conference with other associations to see what arrangement can be made to this end. The relations existing between the local and national associations was also referred to this committee to investigate the cost and condition of the local and national associations and ascertain whether by certain combinations the total expenses cannot be reduced. This proposition may require considerable change in the constitution and by-laws of the present organization. It will certainly have the effect of eliminating certain elements of friction and make more definite the functions of each.

It is expected to relieve Commissioner Dubrul by July 1. The committee has a prominent man in view for this position, but is withholding his name for the present. The proposition submitted some time since to appoint an assistant to the commissioner was abandoned, owing to present financial conditions. The following resolutions were adopted:

Whereas, In accepting the resignation of E. F. Dubrul, commissioner of the National Metal Trades Association, we, the Administrative Council of that body, desire to place on record our deep appreciation of the valuable services rendered by him, recognizing the fact that it is principally through the unselfish efforts of Mr. Dubrul that the association occupies the high place it does today; therefore be it

Resolved, That we do hereby accept the resignation of Mr. Dubrul with sincere regret; and further be it

Resolved, That we wish most earnestly for him every success in his future undertakings.

Signed by the committee and unanimously adopted by the council.

Robert Wuest, formerly secretary to Commissioner Dubrul, was made secretary of the association, and signified his willingness to remain.

The situation in the machine shops in St. Louis appears to be one of victory for the employers. The members of the St. Louis Metal Trades Association put a notice in the pay envelope of every man to the effect that he must abide by the shop rules, and also inclosed a copy of those rules. The notice stated that any one unwilling to conform to this regulation must quit, and it was expected that the men would strike, but up to date they have not done so.

Article 9 of the by-laws, which was passed by the convention at Philadelphia and referred to the Administrative Council for legal advice, was decreed effective from and after this date. The idea of the article is to make the procedure in handling strikes more definite and certain.

The article in full is as follows:

Sec. 1. Whenever a disagreement shall arise between a member and his employees such as seems liable to lead to collective action on their part, immediate written notice thereof shall be given to the commissioner and chairman of the district. These officers shall be kept fully advised until such difficulty is finally adjusted.

Sec. 2. Whenever a collective demand is made by employees on a member of this association notice of such demand in writing shall be immediately sent to the commissioner and district chairman, and a full account or copy of such demands shall be mailed to such officers. (Note.—Whenever possible it shall be insisted that such demands shall be put in writing and a statement made to those presenting the demands that a copy will be forwarded to the National Metal Trades Association.)

Sec. 3. Attendance of Commissioner.—If in the judgment of the chairman or the commissioner a representative of the association is required on the grounds, the commissioner shall at once proceed to the scene of the difficulty or deputize, in writing, some responsible person to act for him.

Sec. 4. Authorization of Strike Defense.—The defense of a strike shall not involve this association unless regularly authorized, in writing, by the commissioner, approved by the Administrative Council. Should the

commissioner and the members disagree as to the measure or method of relief, the member may appeal to the Administrative Council, and its decision shall be final.

Sec. 5. Methods of Relief.—Any of the following methods may be adopted by the commissioner for the relief and protection of members:

A.—Assistance in procuring men to replace strikers (in which case the number of men so procured by this association shall in no instance exceed 70 per cent. of the number of the particular trade or trades on strike which were employed previous to the difficulty, as shown by the last quarterly reports).—If, in order to procure men in the event of a strike, it shall be necessary to pay a bonus to secure their services, such bonus may be paid at such rate and to continue only during such time as the Administrative Council may decide.

B.—Legal measures.—The employment of legal measures to be invoked only on the written authorization of the commissioner.

C.—Having members' work done.

D.—Financial assistance.—In cases where the Administrative Council may determine that financial assistance be necessary, in addition to relief measures A, B, or C, such assistance may be rendered in such amounts and at such times as the Administrative Council decides.

Sec. 6. Conduct of Strike.—The conduct of the strike shall be voted in the District Committee, acting under the direction of the commissioner, in order to be binding upon the association.

Sec. 7. Directions entailing an expense must be given or confirmed, in writing, by the commissioner. Such directions shall be given in advance of the action, and a limit be set to each expense so authorized. Any expense bill which has not been so authorized before it is incurred shall not be approved by the commissioner, but shall be referred to the Administrative Council for final action.

Sec. 8. Authorized relief expenses shall be paid and charged to the reserve fund.

PERSONAL.

T. F. Manville, president of the H. W. Johns-Manville Company, New York; E. B. Hatch, president of the Johns-Pratt Company, Hartford, Conn., and J. W. Perry, manager of the electrical department of the former company, sailed for England on April 26, and will return about June 10.

James W. Lyons has been promoted from the position of assistant chief of the engine department of the Allis-Chalmers Company to that of manager of the newly created power department, which includes all the four powers embraced by the new line of machinery built by that company. His headquarters will be in Chicago.

Philip R. David, superintendent of the rolling mills at the Duquesne Steel Works, has been appointed to the same position at the Clairton Steel Company, recently taken over by the United States Steel Corporation. It is stated that this change is the first of a number to be made in the operating department of the Clairton plant.

C. O. Baker, president of Baker & Co., Incorporated, Newark, N. J., and New York, refiners and artisans in platinum, gold and silver, sailed May 18 on the White Star steamship "Cedric," for his annual trip abroad.

John W. Day, vice-president of the Moline Pump Company, Moline, Ill., recently addressed the students of the State Agricultural College at Ames, Iowa, on the value and practicability of the Eli gasoline engine as a motive power producer.

Cyrus Robinson, vice-president and general manager of the Power and Mining Machinery Company, 52 William street, New York, will shortly leave for a trip to Mexico, where he will assist in putting in operation the new gas power plant of the Velardena Mining & Smelting Company at Velardena, near Durango, Mexico, the contract for the installation of which the company received some time ago.

F. H. Treat, the well known consulting engineer, with

offices in the Empire Building, Pittsburgh, has just returned from a four months' business trip through Colorado, Arizona and Mexico. Mr. Treat spent much of his time in Mexico visiting the more important mines in that country.

Charles M. Schwab sailed for Europe on Tuesday by the North German Lloyd steamship "Kronprinz Wilhelm" for a brief business trip.

The History of the Thomas Iron Company.

An interesting feature of the fiftieth anniversary of the Thomas Iron Company was the presentation to each of those present at the gathering this week of the history of the Thomas Iron Company, prepared by President B. F. Fackenthal, Jr., of Easton, Pa. This is a magnificent work, constituting not only a history of the company, but presenting so many portraits of men identified with the company, views of works and maps of properties, that it forms an album. It comprises 100 pages and is a superb specimen of printing and engraving. From this work we learn that the first preliminary meeting for the formation of the company was held at Easton, Pa., February 14, 1854; on April 4, in the same year, a grant of the charter under the general corporation laws of Pennsylvania was made, and on May 25 the election of the Board of Directors took place. At the first meeting, which was attended by 18 persons, a resolution was adopted calling the company the Thomas Iron Company, in honor of David Thomas, who projected the company, and in recognition of his work as pioneer in the successful manufacture of anthracite pig iron. At this meeting a committee was appointed to select a site for the works. At a subsequent meeting the committee reported that they had authorized the purchase of the Thomas Butz farm, situated on the Lehigh River, about a mile above Catasauqua, Pa., as the most eligible site for the works. The name Hokendauqua was selected by David Thomas himself. The price paid for this farm, which contained a little over 185 acres, was \$37,112.50.

At a meeting of the Board of Managers held March 14, 1854, the construction of two blast furnaces was decided upon, and the superintendent was authorized to make contracts for the necessary fire brick. A contract was made with Samuel McHose of Allentown, Pa., under date of May 10, to do all the mason work and bricklaying for both furnaces. A contract was made April 7 with Jeremiah Bunce and others for boilers, at a cost of \$9353, on the wharf at Brooklyn, and another on April 21 with Robert P. Parrott for two beam blowing engines, on boat at Cold Spring, N. Y., for \$42,600, the engines to have steam cylinders of 56 inches diameter and blowing cylinders of 84 inches diameter by 9-foot stroke.

There were 26 original subscribers who accepted the charter of the company, but of these 26 men all have passed away except Samuel Thomas. At the formation of the company he was appointed superintendent, and intrusted with the construction and management of the works. Though only 27 years old, he was fully equipped for this position, having been employed at the Crane Iron Works from the age of 16 until he was sent, in 1848, to Boonton, N. J., where he constructed and successfully put in blast an anthracite furnace. Resigning his position at Boonton, December 3, 1848, he returned to Catasauqua to assist his father in the building of furnaces Nos. 4 and 5 of the Crane Iron Works. He was appointed a director of the Thomas Iron Company and elected president August 31, 1864, and resigned the office of president September 22, 1887, in order that he might carry out a long cherished plan of establishing iron works in Alabama. He has remained, however, in the Board of Directors of the company up to the present time, and the company have continued to have the benefit of his experience and advice.

The book contains a biography of David Thomas and a history of his connection with the iron trade, including an account of his achievement in first successfully operating a blast furnace with anthracite pig iron in Wales in 1837. While Mr. Thomas was always one of the active ruling spirits of the Thomas Iron Company from their

formation in 1854 up to his death in 1882, yet, owing to the fact that he was actively engaged in the management of the Crane Iron Works, he was not an officer of the Thomas Iron Company until February 6, 1860, when he was elected a director. From March 21, 1872, to September 18, 1873, he held the office of vice-president.

A noteworthy feature of this book is the tribute paid to the long service of employees in subordinate positions. The names of a great many of these employees, with the length of their service, are preserved in these pages. A comparison is given showing the changed conditions in the iron trade during the time that has elapsed from the starting of the company's original furnaces. In 1864 "Percy's Metallurgy," published in London, selected the Thomas Iron Company's furnaces at Hokendauqua as standing pre-eminent in illustrating the furnaces of America. Dr. Percy reports the No. 1 furnace as having made an average of 248 tons 7 cwt. 3 quarters of pig iron per week during a blast of 186 weeks, with a fuel consumption of 4452 pounds per ton of pig iron. This same No. 1 furnace, which was rebuilt in 1894 and equipped with regenerative stoves in 1897, has produced as much as 1327 tons of iron per week, with a fuel consumption for a period of six months of 2428 pounds.

The first shipment of pig iron from No. 1 furnace was made July 2, 1855, to Butz & Yard, Easton, Pa.; grade, No. 1 X; price, \$27 per ton. The highest price ever received for iron made by the company was \$75 per ton, at the furnace, for No. 1 X, on August 20, 1864, but on this date gold was selling at 256.5 to 257.5. The lowest price received for No. 1 X was on March 3, 1898, when an order was entered for 300 tons at \$10.60 per ton, at furnace. The total amount of pig iron produced in 50 years is 4,512,030 tons 9 cwt. One year's output at the present time is as great as it was during the first nine years after the furnaces commenced producing. This is due, first, to the greater number of furnaces, and, second, to their increased capacity.

Early in recognizing the importance of the chemical laboratory, the company engaged Dr. P. W. Shimer as their first chemist, November 17, 1878, the first laboratory being established at Alburtils. The main laboratory at Hokendauqua is a model iron works laboratory, complete in all its equipment.

The number of stockholders of the company at present is 487, made up of 211 men, 193 women, 75 estates and trustees and 8 banks and trust companies. The present capital stock is \$2,500,000, divided into 50,000 shares with a par value of \$50 per share. The total amount of stock issued for cash is \$466,155; the balance, \$2,033,844, represents surplus earnings for which dividends have been made. In addition to the stock dividends, which amount to 208.16 per cent., cash dividends have been paid semi-annually on February 1 and August 1, almost without interruption, and amount to 352.75 per cent., making the stock and cash dividends during the past 50 years aggregate 560.91 per cent. The first dividend was declared July 27, 1856, and the last one was paid February 1, 1904. The company have no bonds, are entirely free from debt and have a large surplus. They claim to be the oldest company in America manufacturing pig iron that has not been reorganized, nor had its original corporate name changed. In their record of 50 years they have used an all ore mixture in making their pig iron and have earned and maintained a reputation for its high class.

The company passed through very trying periods, but the worst was the panic of 1857, during which time cash payments were suspended, customers owing large amounts asked for extensions; some settlements were made at 50 per cent. and some accounts became a total loss. During this panic the directors and some of the stockholders not only indorsed the paper of the company, but filed with the banks at Easton and Catasauqua a personal bond guaranteeing the company's credit.

It is a matter of some interest to learn that the company paid a national tax directly to the United States Government on pig iron produced from July, 1864, to December, 1866, amounting to \$200,423.83.

At the close of 50 years the company have nine active furnace stacks, of which four are at Hokendauqua, two

at Alburdis, one at Island Park and two at Hellertown, with a total annual capacity of 260,000 tons. The company have progressed with the times, and further improvements at the furnaces are contemplated. An order has just been placed for two pairs of modern compound blowing engines for furnaces 1 and 3 at Hokendauqua, each capable of blowing 40,000 cubic feet of air per minute, under a pressure of 25 pounds, which will enable the company to greatly increase the output of these two furnaces.

The property of the company, in addition to the furnaces above named, includes tracts of ore lands at various points in the Lehigh Valley, Pennsylvania, and in New Jersey. Their principal mine in New Jersey is the Richard mine, located in Morris County, near Dover. The total output of this mine since it was purchased by the company in 1858 to February 28, 1904, was 2,212,838 tons, being an average of 46,000 tons per year; but the average output during the last eight years was 101,939 tons. This is magnetic ore of high grade, averaging 60.19 per cent. metallic iron, 0.75 per cent. phosphorus, 6 per cent. silica, 5 per cent. lime and 3 per cent. alumina. The company also own the Iron-ton Railroad, running through a large part of Lehigh County, to facilitate the development of brown hematite iron ore properties, and have a large interest in the Catasauqua & Fogelsville Railroad, which runs through local ore deposits.

The present officers are as follows: B. F. Fackenthal, Jr., president and general manager; William H. Hulick, vice-president; James W. Weaver, secretary and treasurer. Directors, Samuel Thomas, William H. Hulick, W. P. Hardenbergh, B. F. Fackenthal, Jr., Fred R. Drake, J. Samuel Krause and J. S. Rodenbough. The managers are as follows: David H. Thomas, general superintendent; Horace Boyd, superintendent Hokendauqua Division; Daniel Davis, superintendent Lock Ridge Division; John W. Thomas, superintendent Keystone Division; Charles E. Hulick, superintendent Saucon Division; Samuel R. Thomas, engineer, and James Arthur, superintendent of mines. The New York sales agent is W. R. Thomas, 95-97 Liberty street, and the Philadelphia sales agent is Philip E. Wright, Stephen Girard Building.

The Iron Wages Conference.

PITTSBURGH, PA., June 1, 1904.—The first of the wage conferences between the Amalgamated Association and the manufacturers will be held on Tuesday, June 7, at Cambridge Springs, Pa. The puddling and finishing scales for rolling mills will be taken up, and the Republic Iron & Steel Company will be represented by James H. Nutt, head of the labor bureau of the company; G. W. Watson, John F. Taylor and John Cornsud. The Amalgamated Association will be represented by the Conference Committee on Finishing and Puddling Scales appointed at the recent Cleveland convention and will be headed by Theodore J. Shaffer, president. The puddling scale for 1904-1905 is based on a minimum of \$5 a ton on a 1-cent card for bar iron, but for several months the puddlers have been receiving \$5.25 a ton, based on a 1.3-cent card. No trouble is anticipated this year on coming to a settlement of the puddling and finishing scales.

The Mechanical Engineers.

CHICAGO, ILL., June 1, 1904.—The forty-ninth meeting of the American Society of Mechanical Engineers, jointly convening at Chicago with the Institution of Mechanical Engineers of Great Britain, was formally opened Tuesday evening. The opening session was held in the Music Hall of the Fine Arts Building, adjoining the Auditorium Hotel, where the two societies will have their headquarters during the convention. In the absence of the Mayor the address of welcome to the city was delivered by the Comptroller, and was responded to on behalf of the American Society by Ambrose Swasey, the president of that body, and on behalf of the English Institution by its president, J. Hartley Wicksteed. After the meeting an informal reception for the members of the two societies and their guests was held in the parlors of the Audito-

rium Hotel. At the time of going to press the total registration of members and guests numbered about 635.

The Handlers' Union in Chicago.

CHICAGO, ILL., June 1, 1904.—The strike of the Heavy Iron and Hardware Handlers' Union is still in force in Chicago, but the employers have taken such a decided stand that the strikers are now beginning to sue for peace, and there is little doubt that the strike is broken. The only firm who signed the agreement was the Crucible Steel Company of America, who were the only crucible steel firm affected and had only four men belonging to the union in their warehouse. The men of the Scully Steel & Iron Company have not gone out at all, nor have the few union men employed by S. D. Kimbark & Co. deserted their posts. Kelley, Maus & Co. and Jones & Laughlin are not affected, because their warehouses are not unionized.

Joseph T. Ryerson & Son are able to handle all the freight in all their warehouses, the office help taking a hand in conjunction with unskilled laborers hired to do the heavy work. The same is true of E. D. Kimball & Co. and A. M. Castle & Co.

Labor Notes.

The strike of the structural iron workers in New Haven, Bridgeport, Derby and Hartford, Conn., has been settled, the demands of the men for 50 cents an hour, an increase from 45 cents, having been granted by their employers. This ends the trouble with structural iron workers throughout Connecticut.

The labor troubles at the works of the Fore River Ship & Engine Company at Quincy, Mass., are nearing an end. The boiler makers returned to work last week, the riveters were already at work, and everything is returning to a normal condition excepting that the shipwrights, numbering about 200 men, have refused to accede to the agreement which has been reached, by which, it is understood, the 55-hour schedule will continue through the summer and fall, to be followed by a 54-hour schedule next winter.

New Publications.

Foundry Nomenclature. Compiled by John F. Burchanan, author of "Brass Founders' Alloys." Publishers, Spon & Chamberlain, 123 Liberty street, New York. Cloth bound. Pages, 225. Price \$2.

This book is intended to be not only a pocket dictionary for the molder, but also a compendium of practical knowledge for daily use. It defines over 2000 words, terms and phrases of special import and application in the foundry, in addition to which it gives notes on foundry apparatus, appliances, materials, metals, test bars, scrap, and also shop receipts, useful memoranda, rules and tables. As a guide to the facts, phrases and terms relating to foundry practice it will undoubtedly be found exceedingly useful.

Vernon S. Wadman, 40 Munroe street, Boston, Mass., has been appointed New England selling agent for the Finished Steel Company, Youngstown, Ohio, manufacturers of polished steel shafting and special shapes, also flats, squares and hexagons in polished steel.

The C., B. & Q. and Chicago Great Western roads some time ago promulgated a rate of \$1.40 on coke originating east of the Illinois and Indiana line from Chicago to St. Paul and points west, but not to intermediate points. This is a reduction of 20 cents per ton on coke freight. It is understood that the other roads are preparing to meet this cut of the freight rate.

The New York Machinery Market.

NEW YORK, June 1, 1904.

Another large machinery list is claiming the attention of the trade. It includes upward of 100 tools, which aggregate over \$100,000 in value. It was issued by the Atchison, Topeka & Santa Fé Railway system, and while it was issued from Chicago, the principals of the large machinery houses here are taking the matter up direct from this city. This machinery will include a complete line of wood and metal working machinery for the shops at Albuquerque, New Mexico, to replace machinery destroyed in a recent fire. The shops at La Junta, Col., which were destroyed by fire, are being rebuilt on a much larger scale than before, and a complete line of machinery of all kinds for these shops is included in the list. In addition to this a large number of tools are for use in various other repair shops along the road. While bids were supposed to close May 25 for this machinery, a good portion of the purchases will be held open for some time longer. It is probable that the machinery for the Albuquerque shop will be selected before the end of this week, while the La Junta equipment will not be definitely selected until two or three weeks later. W. E. Hodges, Railway Exchange Building, Chicago, general purchasing agent, has the matter in charge. The list is as follows:

DRILLS.

Two 30-inch drill presses, with back gears and automatic feeds.
 One 36-inch upright drill press, with back gears and automatic feeds.
 One 42-inch upright drill press, with back gears and automatic feeds.
 One full universal radial drill press, 5-foot arm.
 Three full half or plain universal radial drill presses, 6-foot arm.
 One upright four-spindle sensitive drill press, with automatic feed and stop and special attachments; capacity, 1-16 to $\frac{1}{8}$ inch diameter.
 One upright six-spindle multiple drill; capacity, 13-16 to $\frac{3}{4}$ inches diameter, motor driven.

LATHES.

One Jones & Lamson 2 x 24 inch flat turret lathe, with locomotive outfit.
 Two 20-inch cabinet turret lathes for brass work, with 7-foot beds.
 Four 16-inch tool room lathes, with 8-foot beds for cutting threads from 2 to 64 inches.
 Three 16-inch engine lathes with 6-foot beds, back gears, compound rest and automatic quick change feed and screw cutting mechanism.
 One 18-inch engine lathe, with 8-foot bed, back gears, compound rest and automatic quick change feeds and screw cutting mechanism.
 Three 24-inch engine lathes, with 12-foot beds, back gears, compound rest and automatic quick change feeds and screw mechanism.
 Two 28-inch engine lathes, with 12-foot beds, back gears, compound rest and automatic feeds.
 One 30-inch heavy pattern engine lathe, 9 feet between centers, with back gears, compound rest and automatic feeds.
 One 32-inch heavy pattern engine lathe, 9 feet between centers, with triple back gears, compound rest and automatic feeds.
 One 36-inch modern heaviest pattern motor driven engine lathe, with 14-foot bed, triple back gears, compound rest and automatic feeds.
 Two 38-inch heavy pattern engine lathes, 9 feet between centers, with triple back gears, compound rest and automatic feeds.
 One modern wheel lathe for turning steel tired car and engine truck wheels; capacity for 42-inch flanged wheels.
 One modern heaviest pattern motor driven driving wheel lathe, to swing 84-inch flanged wheels.
 One modern heaviest pattern motor driven driving wheel lathe, to swing 84-inch flanged wheel, motor to operate three-phased 60-cycle alternating current, 440 volts.

PLANERS.

One 30 x 30 inch planer, to plane 10 feet long.
 One 36 x 36 inch planer, to plane 12 feet long.
 Two 36 x 36 inch planers, to plane 12 feet long, with power elevating mechanism for cross rail and two regular heads on cross rail.
 One 42 x 42 inch planer, to plane 12 feet long, with power elevating mechanism for cross rail, two heads on cross rail and one head on each side.

BORING MACHINES.

Four 42-inch vertical boring and turning mills, table of largest possible diameter.
 Two motor driven modern heavy pattern 51-inch vertical boring and turning mills, table of largest possible diameter.
 One modern heavy pattern 84-inch motor driven vertical boring and turning mill, table of largest possible diameter.
 One modern heaviest pattern 84-inch motor driven vertical boring and turning mill, table of largest possible diameter.

MILLING MACHINES.

One small universal back gear milling machine.
 One 50-inch full universal automatic gear cutting machine for spur, miter, bevel and worm gears.

GRINDING MACHINES.

One small universal tool grinder, about 12 x 30 inches.
 One universal tool grinder, about 12 x 40 inches.
 One twist drill grinder; capacity, $\frac{1}{8}$ to $\frac{3}{4}$ inches.
 Two Sellers No. 1 universal tool grinding machines.
 Four water tool grinders, with emery wheel about $2\frac{1}{2}$ x 20 inches.
 One surface grinding machine, with reciprocating table, specially adapted to truing locomotive guide bars; capacity, 4 x 9 x 80 inches.

THREADING MACHINES.

Two pipe cutting and threading machines, for pipe $\frac{1}{4}$ to 4 inches.
 One motor driven pipe cutting and threading machine, for pipe $\frac{1}{4}$ to 8 inches.

One 2-inch double head bolt cutter, with two 12-thread lead screws and dies for threading bolts from $\frac{1}{8}$ to 2 inches.

One double head stay bolt cutter, to cut 36 inches long without regripping, and equipped with power feed, automatic stop and lead screws for 12 threads per inch.

One triple head stay bolt cutter, to cut 12 inches long without regripping, equipped with power feed, automatic stop and lead screws for threading stay bolts 12 threads per inch.

MISCELLANEOUS MACHINE SHOP TOOLS.

Three 24-inch back geared or friction driven crank pillar shakers.

One nut facing machine for facing hexagon nut, $\frac{3}{4}$ to 2 inches.

One motor driven locomotive driving wheel quartering machine, to take 84-inch flanged wheels and to quarter wheels of engines having 22 to 36 inch stroke.

One combination cold saw cutting off machine.

One portable locomotive boring machine, bar $4\frac{1}{2}$ inches in diameter, to bore 7 feet 6 inches long, with cutting heads for diameters varying from 8 to 32 inches.

One 250-ton hydraulic portable crank pin press.

One portable locomotive crank pin truing machine.

Two Warner & Swazey revolving jaw chucks.

MISCELLANEOUS BOILER SHOP TOOLS.

One hand lever splitting shear for 7-16-inch boiler plate.

One boiler plate flanging plant, 10 feet between housings.

Three horizontal boiler plate power bending rolls, about 6 feet 2 inches between housings, one to have capacity for $\frac{1}{4}$ -inch plate and two for $\frac{3}{4}$ -inch plate.

One portable coal burning rivet forge.

SMITH SHOP TOOLS.

One eye bending or eye bolt machine, capacity $1\frac{1}{2}$ -inch round iron.

One heavy double geared belt driven bulldozer for railway car work.

One heavy double geared motor driven bulldozer for railroad car work.

One 80-pound power cushion held or Bradley hammer.

One 800-pound single frame steam hammer.

One 1500-pound single frame steam hammer.

TIN SHOP TOOLS.

One setting down machine.

One circular shear for cutting tin $2\frac{1}{4}$ to 15 inches diameter.

One foot power squaring shears to cut No. 16 iron, 42 inches long.

MISCELLANEOUS STEAM DRIVEN MACHINERY.

One 45 horse-power simple horizontal self contained automatic high speed engine.

Six duplex steam pumps, 10 x 6 x 12 inches.

One steam driven air compressor to furnish 100 feet of free air per minute.

WOOD WORKING MACHINERY.

Two 16-inch hand planers and jointers.

Two 36-inch band saws to cut 14 inches high.

One universal rip and cut off saw, with table, about 35 x 44 inches, with 14-inch saws.

One heavy self feed rip saw table with carrying out rolls.

One automatic car gaining machine with 12 or 14 foot table.

ELECTRIC MOTOR.

One 3 horse-power electric motor.

A. Clement of Lavallois-Peret, France, the largest automobile builder in the world, is making inquiries for and purchasing a large amount of American machinery. We are informed that large extensions are to be built to the plant at Lavallois and also to the Clement plant in England. The French shops constitute an immense plant and are very extensively equipped with American machinery. Several years ago Mr. Bardous, who was then superintendent of the automobile branch of the Pope Company, at Hartford, took a corps of skilled American workmen and a large amount of the most improved American machinery to the Lavallois plant and put the works on as nearly an American basis of operation as was possible. It is natural, therefore, that now, with extensive enlargements in view, the concern should look to this country for their new equipment. For some time past M. Clement has been considering the advisability of erecting large works in this country. He went so far as to visit America a little over a year ago and establish a small shop at Hartford, Conn. This shop was to be devoted to the manufacture of motor cycles at first, and branch out later into the building of automobiles. For some reason not generally known the enterprise was never pushed very energetically and very little has been done at the Hartford plant. The big plans never matured. After his return to France M. Clement sent his nephew, Ernest Roguet, to this country, and he is still at the Hartford shop, which is located at 350 Sheldon street. Up to this writing we have been unable to learn whether the scheme of establishing large works in this country has been abandoned or not. So far as the selling of automobiles is concerned, M. Clement is represented in this country by Sydney B. Bowman of the Sydney Bowman Automobile Company, 52 West Forty-third street, New York.

Another large plant is to be established in Canadian territory by an American concern, which will necessitate installation of a great deal of machinery, which, in all probability, will be purchased in this country. The Robb-Mumford Boiler Company, 170 Summer street, Boston, Mass., have increased their capital stock to \$450,000 for the establishment of a new plant, which will be erected probably in the vicinity of Amherst, Nova Scotia, though the exact location has not been decided upon. It will be remembered that the Mumford internally fire boilers were formerly made by the Robb Engineering Works, Boston, and that the Robb-Mumford Boiler Company were incorporated some time ago to take up the manufacture of these boilers. D. W. Robb is president of both of the companies.

In their scheme for balancing the plant of the Locomotive & Machine Works at Montreal, Canada, which was recently taken over by the American Locomotive Company, New York, several of the buildings are to be enlarged, including the erecting and boiler shops. The principal enlargement, however, will be made to the foundry, an addition to which is to be built similar in size to the present building and doubling the capacity. A short time ago, it will be remembered, the American Locomotive Company placed orders for considerable machinery to complete the mechanical equipment of the Montreal plant, and it is probable that more machinery will be purchased soon, including foundry equipment.

The Allis-Chalmers-Bullock Company, Limited, announce that they have taken over the business and representation in Canada of the Bullock Electric Mfg. Company, Canadian Bullock Electric Mfg. Company, Limited, Allis-Chalmers Company, Ingersoll-Sergeant Drill Company, Lidgerwood Mfg. Company, Wagner Electric Mfg. Company and Canadian Engineering Company, Limited. Head office and works will be located at Montreal, and branch offices will be maintained at Toronto, Winnipeg, Halifax, Vancouver and Rossland. The new organization will operate in the closest relations to the American companies and manufacture machinery identical in design.

The Power & Mining Machinery Company, 52 William street, New York, have just received a large contract for the equipment of a new power plant for the Wellington Meat Expert Company, a British concern who operate large works at Wellington, New Zealand. The contract is valued at about \$125,000, and covers gas generating and electrical machinery, the latter of which comprises electric generators, motors, &c., which the company will soon be ready to purchase. There will be a 3000 horse-power gas generating outfit, consisting of six generators of 500 horse-power each, to operate on the Loomis Pettibone system, supplying two cylinder horizontal American Crossley gas engines. There will be nine of these engines, aggregating in all 1415 horse-power, three of which will be of 225 horse-power each, direct connected to 150-kw. generators. There will also be two 200 horse-power, one 160 horse-power, one 100 horse-power gas engines, to be used for driving the refrigerating machinery. The present works of the Wellington Company are operated by steam, but owing to the excessive cost of coal in that part of the world the installation of gas generating equipment was decided upon, as it is expected to result in the saving of 75 per cent. in fuel. It is expected that the new plant will be in operation in December. The Power & Mining Machinery Company have also received an order from the Lexington Railroad Company, Lexington, Ky., for a 500 horse-power American Crossley gas engine to supplement their present power equipment. It is fully expected that the railroad company will shortly place orders for several more units of Crossley gas engines, and also for gas generating apparatus.

MacKenzie, Quarrier & Ferguson, 114-118 Liberty street, New York, have made an arrangement with the Shepherd Engineering Company, Franklin, Pa., whereby they will represent them as sales agents for their Shepherd vertical automatic engines. These engines are built in all sizes up to 1500 horse-power, and in simple, steeple and cross compound, single valve and four valve types, covering the field of horizontal engines. The firm will continue to offer the products of the Harrisburg Foundry & Machine Works, Harrisburg, Pa.

The Mesta Machine Company of Pittsburgh, Pa., have opened an Eastern sales office at 85 Liberty street, New York. John A. Schroeder has been appointed manager. The company announce that they will compete for orders for the largest Corliss engines for power plants, machine molded gears and rolling mill machinery.

The Bureau of Supplies and Accounts, Navy Department, Washington, will receive bids until June 21 for the following machine tools for the navy yards, Portsmouth, N. H.; Boston, Mass.; New York; League Island, Pa.; Washington, D. C.; Norfolk, Va., and Pensacola, Fla., comprising lathes, drills, drill press, punches, shapers, planers, grinders, saws, molders, cutting machines, plate bending machine, boring mill, duplex folding press, arbor presses, locomotive steam cranes, air compressor, concrete mixer, electric elevators, tubular boiler, hydraulic jacks, hand trucks and installation of fire extinguishing apparatus.

The following is a classified list of the machine tools for the Mare Island Navy Yard, bids for which will be opened June 22: One turret lathe, two wood turning lathes, one double dry grinder, one plain double dry grinder, one plain double dry grinder, one automatic knife grinder, one universal tool grinding machine, one improved scroll saw, one 42-inch band saw, one improved band sawing machine, one motor driven heavy pattern lighting self feeding rip saw, table, one metal cutting circular saw, two motor driven shapers, one improved hand jointer, one double spindle upright molding machine, one automatic plug cutting machine, one pipe threading and cutting machine, one four-spindle nut taper, six electrically operated sensitive bench drills and one heading upsetting and forging.

Bids were opened at the Bureau of Supplies and Ac-

counts, Navy Department, on May 24 for furnishing machine tools at the navy yards, as follows:

Bidder 1. American Machinery Company, Grand Rapids, Mich.

2. Camden Iron Works, Camden, N. J.
3. Motley, Green & Co., New York.
4. H. A. Rogers, New York.
5. Prentiss Tool & Supply Company, New York.
6. Hill, Clarke & Co., Boston, Mass.
7. Berlin Machine Works, Beloit, Wis.
8. Henry Pels & Co., New York.
9. Falkenau-Sinclair Machine Company, Philadelphia, Pa.
10. George A. Ohl & Co., Newark, N. J.
11. Henry R. Worthington, New York.
12. The Lawrence Machine Company, Lawrence, Mass.
13. Montgomery & Co., New York.
14. Brown & Zortman Machinery Company, Pittsburgh, Pa.
15. Bentel, Margedant & Co., Hamilton, Ohio.
16. Baxter D. Whitney & Son, Winchendon, Mass.
17. H. B. Smith Machine Company, Smithville, N. J.
18. Wilmarth & Morman Company, Grand Rapids, Mich.
19. The Challenge Machine Company, Philadelphia, Pa.
20. Railway Appliances Company, Chicago, Ill.
21. Charles E. Wright Company, New Orange, N. J.
22. Niles, Bement & Pond Company, New York City.
23. Drew Machinery Agency, Manchester, N. H.
24. Fox Machine Company, Grand Rapids, Mich.
25. Manning, Maxwell & Moore, New York.
26. George Place, New York.
27. Chandler & Farquhar Company, Boston, Mass.
28. The Fairbanks Company, New York.
29. Manhattan Supply Company, New York.
30. George F. Blake Mfg. Company, New York.
31. M. T. Davidson, Brooklyn, N. Y.
32. Niagara Machine & Tool Works, Buffalo, N. Y.
33. Fox Bros. & Co., New York.
34. American Woodworking Machinery Company, New York.

35. The Garvin Machine Company, New York.
36. Wm. L. Sargent, Fitchburg, Mass.

Class 1. One portable hydraulic press of 100 tons capacity on four wheels with pump, oil tank, cylinder and gauge complete—Bidder 2, \$350; 5, \$509; 4, \$457.20; 23, \$295 and \$322; 25, \$525; 28, \$484 and \$485; 33, \$314.99.

Class 2. One pattern and core box machine—Bidder 24, \$210; 25, \$215; 26, \$394; 28, \$200.

Class 3. One 25-inch and 50-inch swing pattern maker's gap lathe with 12-foot bed complete—Bidder 1, \$1,146.10, \$795 and \$580; 5, \$689; 25, \$770; 36, \$492.

Class 4. One duplex hydraulic pressure pump to be furnished complete on existing foundations—Bidder 30, \$1745; 31, \$3300.

Class 5. One 18-inch standard pattern engine lathe, 19 1/4-inch swing and 8-foot bed—Bidder 6, \$606; 22, \$600; 25, \$542 and \$550; 27, \$629; 28, \$484; 35, \$552.

Class 6. Three pumps complete with engine and motor capacity 3000 gallons, 3500 gallons and 2000 gallons, respectively—Bidder 2, \$17,300; 3, \$12,650; 11, \$10,895; 12, \$9189 and \$7605; 29, \$14,155.25.

Class 7. One cold saw cutting off machine, direct electrically driven, complete with motor—Bidder 20, \$1550; 25, \$2456 and \$2972.

Class 8. One hand planer and joiner—Bidder 1, \$484.30; 4, \$225; 5, \$220; 7, \$215; 15, \$272; 17, \$228; 24, \$220; 25, \$265; 26, \$359; 34, \$270.40.

Class 9. One heavy planer and smoother—Bidder 5, \$575; 7, \$550; 15, \$480; 16, \$566; 17, \$575; 23, \$595 and \$825; 25, \$650; 26, \$549; 34, \$528.20.

Class 10. One scroll saw complete—Bidder 5, \$83; 15, \$77; 17, \$65; 24, \$97.50; 25, \$95; 26, \$110; 34, \$88.60.

Class 11. One saw bench, cut off, automatic, complete—Bidder 15, \$175; 25, \$250; 26, \$230.

Class 12. Two saw benches, universal—Bidder 1, \$679.32; 5, \$384; 15, \$300; 17, \$374; 24, \$257; 25, \$296; 26, \$182.

Class 13. One saw bench, universal—Bidder 1, \$314.50; 6, \$194 and \$184; 14, \$258; 15, \$188; 24, \$200; 25, \$248; 26, \$275; 34, \$313.40.

Class 14. One band saw, 36-inch wheel, complete, with belt and countershaft—Bidder 1, \$389.21; 4, \$205; 5, \$211; 15, \$188; 17, \$195; 21, \$167.42; 24, \$209; 25, \$195; 26, \$315; 34, \$202.70.

Class 15. One single surface planer—Bidder 5, \$550; 7, \$450; 15, \$480; 17, \$575; 25, \$296; 26, \$647; 34, \$528.20.

Class 16. One hand planer—Bidder 1, \$432.66; 5, \$223; 7, \$200; 15, \$240; 17, \$197; 23, \$260; 24, \$187; 25, \$178; 26, \$215; 34, \$210.50.

Class 17. One boring machine, universal, single spindle, complete—Bidder 3, \$125; 15, \$120; 23, \$125 and \$150; 25, \$99; 26, \$140; 34, \$140.

Class 18. One emery grinder, complete, one grindstone, mounted—Bidder 13, \$57; 18, \$68.80; 19, \$60; 22, \$107.50; 23, \$73; 24, informal; 28, \$62.44.

Class 19. One 3-foot sheet metal power press or brake, electrically driven, with suitable gearing complete—Bidder 9, \$975 and \$1025; 10, \$990.

Class 20. One wire crimping machine, electrically driven, complete, with suitable motor direct current, 110 volts—Bidder 10, \$849.

Class 21. One 6-inch by 61-inch triple back geared slip roll forming machine, electrically driven, complete with suitable motors—Bidder 10, \$900; 32, \$738.

Class 22. One 18-inch slitting shear—Bidder 10, \$99; 23, \$136.

New York.

NEW YORK, June 1, 1904.

Pig Iron.—The market in this territory has been very quiet, buyers taking metal only from hand to mouth. Furnaces are beginning to blow out. Oxford has stopped, Top-ton is soon to blow out, and the two Henry Clay furnaces at Reading have been crippled by a fire. We quote: Northern No. 1, \$15 to \$15.25; No. 2 Foundry, \$14.25 to \$14.50, and Gray Forge, \$13 to \$13.25, tidewater. Tennessee and Alabama brands are \$13 to \$13.25 for No. 2 Foundry and \$12.50 to \$12.75 for No. 3 Foundry.

Cast Iron Pipe.—It is understood that the contract for 4100 tons of 6 to 18 inch Pipe, let at Hudson, N. Y., last week, was secured by a Philadelphia manufacturer, whose bid was considerably under that of his competitors. The Newark contract for 1700 tons of 4 to 24 inch Pipe was divided between a New Jersey company and the leading interest, the former securing the large sizes constituting the greater part of the contract. Nothing of any importance is at present in sight, and manufacturers are looking for a quiet condition of trade. Quotations on carload lots are continued at \$28 per gross ton for 6 to 10 inch, and \$27 for 12-inch and upward at tidewater. Anything of a desirable character would be taken at considerably lower prices.

Finished Iron and Steel.—Bridge manufacturers report an absence of inquiry. Enterprises which had been expected to develop by this time are very slow to take shape. Railroad companies are doing practically nothing in this line, and manufacturers are apprehensive of a very light demand from that quarter for the remainder of the year. The local building trade is much less active than had been expected, so that the demand for building shapes is running far below average requirements. The Plate trade is fully as quiet as during the past month, the boiler makers' strike continuing to restrict the usual demand from the boiler shops and shipyards. Bar Iron maintains its price, but the new business now being booked is not heavy. We quote, at tidewater, as follows: Beams, Channels, Angles and Zees, 1.74½c. to 2c.; Tees, 1.79½c. to 2c.; Bulb Angles and Deck Beams, 1.84½c. to 2.05c. Sheared Plates in carload lots are 1.74½c. to 1.85c. for Tank, 1.84½c. to 2c. for Flange, 1.94½c. to 2.10c. for Marine, and 1.94½c. to 2.50c. for Fire Box, according to specifications. Refined Bar Iron and Soft Steel Bars, 1.49½c.

Old Material.—Consumers are buying very little, while dealers are taking nothing unless it is offered at bargain prices. Such transactions as have come to light the past week have been made at special prices, which have depended entirely upon the peculiar circumstances attending the sale. Under the conditions ruling now it is exceedingly difficult to make quotations, but the following are given as about what holders might be able to realize per gross ton, New York and vicinity:

Old Iron Rails.....	\$14.00 to \$14.50
Old Steel Rails, long lengths.....	12.00 to 12.50
Old Steel Rails, short pieces.....	10.00 to 10.50
Relaying Rails.....	17.00 to 18.00
Old Car Wheels.....	11.00 to 11.50
Old Iron Car Axles.....	15.50 to 16.00
Old Steel Car Axles.....	14.00 to 14.50
Heavy Melting Steel Scrap.....	10.00 to 10.50
No. 1 Railroad Wrought Scrap.....	11.50 to 12.00
Iron Track Scrap.....	10.50 to 11.00
Wrought Pipe.....	8.00 to 8.50
Ordinary Light Iron.....	6.50 to 7.00
Cast Borings.....	3.50 to 4.00
Wrought Turnings.....	5.50 to 6.00
No. 1 Machinery Cast.....	10.00 to 11.00
Stove Plate.....	8.00 to 8.50

Metal Market.

NEW YORK, June 1, 1904.

Pig Tin.—There has been a sharp decline in prices, both in London and here, owing, it is said, primarily to extensive offerings from the Far East at low prices. The small demand from consumers in this country has left conditions here in such shape that very little influence was needed to cause a reduction in values. The visible supply, as shown in the monthly statistics given below, indicate an increase above last month, but show a decrease as compared with the corresponding period of last year. Spot Tin is quoted here at 26.80c. to 27.20c., and June at 26.70c. to 27.12½c. The London market is cabled to-day as follows: Spot, £122 2s. 6d.;

futures, £121 15s. The monthly statistics as compiled by C. Mayer, secretary of the New York Metal Exchange, show the following: The total visible supply on May 31 is 1854 tons below that of May 31 of last year.

Arrivals at the Atlantic ports amounted to.....	Tons. 3,615
Total arrivals since January 1, 1904.....	16,246
Of which from Straits by direct steamers.....	5,915
Of which from United Kingdom.....	9,257
Of which from Holland.....	294
Of which from European Continent.....	780
The deliveries for May we figure as.....	3,900
Total deliveries since January, 1904.....	15,600
Deliveries same period in 1903.....	18,200
The shipments from Straits amounted to.....	4,850
Against previous month.....	5,487
Against May, 1903.....	5,565
Australia shipped.....	285
Against previous month.....	313
Against May, 1903.....	325
Statistics for the United States—Pacific ports excluded—	
May 31, shows as follows:	
Stocks, including on dock and arrivals.....	2,017
Afloat.....	2,924
Total.....	4,941

The total statistics for Europe and the United States show:

Total visible supply May 31, 1904.....	Tons. 14,609
Against visible supply April 30, 1904.....	13,695
Against supply May 31, 1903.....	16,463

Copper.—While there is no quotable change so far as the figures posted on the New York Metal Exchange by the producers are concerned, the market is considerably easier than it was last week, and outside lots can be had at ½c. below the quoted figures. The demand is still exceedingly light. Prices are as follows: Lake, 13c. to 13¼c.; Electrolytic, 12¾c. to 13c.; Casting, 12½c. to 12¾c. The London tables name £56 12s. 6d. for both spot and future and £60 10s. for Best Selected. The exports for the month of May amounted to 14,377 tons, making the total for the first five months of this year 97,370 tons, as compared with 55,231 tons for the corresponding period of last year.

Pig Lead.—Another reduction in prices was made by the American Smelting & Refining Company last Friday. The price of 4.35c. was reduced to 4.25c. This is the base price for Desilverized in lots of 50 tons or more, shipments to be made at the option of the company within two to four weeks. Spot, ex store New York, is quoted here 4.35c. to 4.40c. St. Louis telegraphs 4.17½c. to 4.20c., and the London market has declined to £11 8s. 9d. During the month of May 6073 tons were exported.

Spelter is very weak and lower. Business is on a very small scale, and the market is generally without interest. Spot is quoted here 4.87½c. to 5c., and sales have been made for June delivery at 4.75c. St. Louis telegraphs sellers at 4.65c., and the London market is unchanged at £22.

Antimony.—There has been a general reduction in prices. Cookson's is offered at 7.50c., Hallett's 7c., and others 6.12½c. The demand is very slight.

Nickel.—The usual amount of business is passing and prices are firm, large lots being quoted at 40c. to 45c. and smaller quantities at 50c. to 60c.

Quicksilver.—The market is quiet, with ample stocks and a demand of moderate proportions. Flasks of 76½ lbs. are quoted at \$45. The London price has declined to £8.

Tin Plate.—The market is unchanged, with a fair demand reported. Quotations are very firm, on the basis of \$3.45 per box for 14 x 20 100-lb. Cokes, f.o.b. mill, equivalent to \$3.64, New York. The Welsh market is unchanged at 11 shillings 6 pence, f.o.b. Swansea.

The Lanyon Zinc Company have issued a new list noting a reduction of 10c. per 100 lbs. on Sheet Zinc. The new basis price is \$6 per 100 lbs. for 600-lb. casks, f.o.b. mill.

The Metallurgical Company of America, 52 Broadway, New York, have incorporated with a capital stock of \$1,000,000 for the purpose of doing a general metallurgical business. The officers and directors are: Walter Merton, president; L. Seeger, secretary; Dr. F. Meyer, treasurer; B. Hochschild, J. Langeloth, and Louis J. Magee.

The Chicago Machinists' Strike

CHICAGO, ILL., June 1, 1904.—The machinists' strike has extended practically to all the machine shops in the city, more than 100 shops being closed down. Both sides are massing their forces for a decisive campaign. The employers forced the issue by demanding a return to the ten-hour day. This was done in order to bring about a general strike instead of permitting the unions to follow their original plan of attacking two or three plants at a time. It is the intention of the Metal Trades Association to start several plants at once with skilled non-union labor.

Chicago Machinery Market.

CHICAGO, May 28, 1904.

While the machinery and gas engine business in the Chicago territory has fallen off somewhat, the decrease is not as marked as might be expected from the general dullness in iron trade circles, and there seems to be a healthy inquiry, sufficiently general in its character to warrant the belief that the balance of the summer will not be as dull as had been feared. Fortunately, outside of the city of Chicago itself, labor troubles are few, and employers feel safe in undertaking new work that was held in abeyance until after the annual May labor disturbances. The machinists' strike in Chicago has not sufficiently advanced to affect current business, but if it is prolonged, as is now feared it may be, the city will lose business that will take months and possibly years to regain.

The most interesting topic discussed among machinery merchants here is the announcement that the Atchison, Topeka & Santa Fé Railroad Company are asking for bids on machinery for their various shops. The complete list is printed in our New York Machinery Market letter in this issue.

Engines, Boilers and Pumps.

The Charter Gas Engine Company, Sterling, Ill., state that they had a very satisfactory business in April, having shipped several carloads into Texas, California and Montana. May business was also good.

The Witte Iron Works Company, manufacturers of gas and gasoline engines, Kansas City, Mo., report that they are running full time supplying their regular agencies and have no reason to complain at the present condition of trade.

The Fuller & Johnson Mfg. Company, Madison, Wis., manufacturers of gasoline engines and agricultural implements, find that trade generally in their line is dull at this season of the year, and that it is even a little below the usual standard this year. Farm work, however, in that territory has been favorably conducted, notwithstanding the season has been late, and they think there are good prospects for abundant crops, and that trade will be better during the latter part of the year than it was last year.

The Gardner Governor Company, Quincy, Ill., say that they have been fairly busy in all departments—governor, pump and air compressor. The demand for governors has been general, many large orders being received from the machinery jobbers throughout the country; in fact, they claim that the demand from this source has been more marked than for any time within the past two years. In the pump line they had had a good export trade, orders being received for shipment to Japan, Russia, Australia and Cuba. The home demand has been satisfactory, and they had a particularly heavy run in large work. They are now making two large 1,000,000-gallon pumps for the Nelson Morris Company of Chicago, two 1,500,000-gallon pumps for the Andalusia, Ala., Water Works and a large 750,000-gallon pump that is intended for export shipment. Their compressor sales, also, have been very satisfactory. They are making up a Duplex 400-foot machine for the Andalusia, Ala., Water Works, and also one of a smaller size Duplex pattern for a large cement works. Inquiries received the past week have decreased in number somewhat, which possibly indicates a slackening in demand.

The Chicago House Wrecking Company, Chicago, find that business in the machinery line during the past 30 days has not been up to their expectations. Their sales in boilers and engines, however, have been quite heavy, and are practically all for about 80 to 100 horse-power outfits. An increasing business during the fall months is anticipated, judging from inquiries that are now coming in.

Machine Tools.

The Fox Machine Company, Grand Rapids, Mich., report that business in their machine department is quiet, there being no exception as to territory. In their typewriter business, however, they are doing one-third more than they were a year ago.

The Hill Tool Company, Anderson, Ind., say that they are experiencing a very satisfactory business. The month of April, however, fell off a little in comparison with April, 1903.

Williams, White & Co., Moline, Ill., report that during the last month they sold quite a large number of bulldozers and Justice hammers. One order they mention was that of a No. 8 bulldozer for the American Locomotive Works at Montreal. Their punch and shear trade has also improved, and the month of May, taken altogether, has been better than previous months.

The George Whiting Company, makers of punches, shears and bending rolls, Chicago, state that business with them during the past month has been rather quiet, though indications at the present are for an improvement. They report sales of punches to parties in Chicago, Wisconsin and Michigan.

The Ransom Mfg. Company, makers of tools for machine shop equipment, Oshkosh, Wis., report that business during the month of May has been better than that of April, the orders coming largely for special machines which the company are making. They have received more orders than were expected during the month, and are well pleased with the way things are going.

The Kemp Smith Mfg. Company, manufacturers of machine tools, Milwaukee, Wis., have recently made several large shipments to London, and now have orders for several more machines for this same place. They made several shipments during May to the Pacific Coast, and feel that business is steadily growing, with excellent prospects for a good fall trade. They are running their plant full force.

Power Transmission Machinery.

The Link-Belt Machinery Company, Chicago, builders of transmission machinery, report that their sales thus far this year have been equal to those of last, and that they have never in their history had so many inquiries as they are receiving. From this they anticipate a very prosperous year.

The Reeves Pulley Company, Columbus, Ind., report a number of recent sales, and state that S. D. Warren & Co., Cumberland Mills, Maine, who have been using four of the large transmissions made by the Reeves Company last week placed an order with them for a No. 10 machine, and advise that they will eventually equip all of their paper machines, 14 in number, with Reeves' transmission. Among the orders for smaller transmission appliances has been one from the B. F. Sturtevant Company for 50 transmissions and 20 machines to the Sprague Canning Machinery Company, Topeka, Ill. An order of ten machines has almost been completed for the Diamond Match Company of Barberton, Ohio. In their wood split pulley department business is reported as very good, particularly in the South.

The Aetna Foundry & Machine Company, makers of hoisting apparatus, Springfield, Ill., say that they have recently sold among other hoisting outfits two to the Springfield Coal Mining Company of Springfield, Ill.; one to the Clark Coal & Coke Company, Peoria, Ill.; one to the Johnston City-Carterville Coal Company, Johnston City, Ill., and one to Robert Solomon of Springfield. They are now figuring on apparatus for the Big Muddy Colliery Company and Frankfort & Big Muddy Coal Company, Benton, Ill.; Norris Coal Mining Company, Norris, Ill.; Union Pacific Coal Company, Rock Springs, Wyo.; Inland Grove Coal Company, New Berlin, Ill.; S. B. Eaton & Co., Du Quoin, Ill.; Inland Coal & Washing Company, Chicago; Norris City Coal Company, Norris City, Ill.; Ensley Coal Company, Petersburg, Ill.; Utopia Coal Company, Curdsville, Ky.; Walter A. Zelnicker Supply Company, St. Louis, Mo.; Alabama Consolidated Coal & Iron Company, Birmingham, Ala., and others, which shows that there are a number of shafts being sunk, and that they are getting a fair number of inquiries. However, they describe business has been comparatively quiet, stating that many seem to be holding off until later in the season before placing their orders.

The Industrial Works, Bay City, Mich., report business very quiet.

The Northern Engineering Works, Detroit, Mich., have made among other recent shipments the following: Brooklyn Heights Railroad Company, one 20-ton crane; Electro Dynamic Company, one 15-ton electric crane; Powers Mfg. Company, 5-ton crane; Williams, White & Co., 10-ton electric crane; Colonial Portland Cement Company, 15-ton electric crane. The outlook for increased business is very good.

The Green Engineering Company, manufacturers of Traveling Link grates, Chicago, have made among other shipments recently the following: La Belle Iron Works, Steubenville, Ohio; Deering Division, International Harvester Company, Chicago; Central Paper Company, Muskegon, Mich.; Hartford City Paper Company, Hartford City, Ind.; Rockefeller Building, Cleveland, Ohio; Michigan Central Railroad Company, Jackson, Mich.; Merchants' Heat & Light Company, Indianapolis, Ind.; E. C. Atkins & Co., Indianapolis; University of Illinois, Champaign, Ill. The company believe that this year's sales will compare very favorably with those of last.

The Stephens-Adamson Mfg. Company, Aurora, Ill., say that conditions with them are much better than they were 60 days ago. They have lately taken several good sized orders, and are now running their factory ten hours per day. They find that inquiries are more numerous, and that there is a general tendency to raise prices. They believe that conditions in their line are going to improve from now on.

Miscellaneous.

The S. Obermayer Company, Chicago, report that they furnished the complete foundry equipment for the Scott & Oliver Mfg. Company, Knoxville, Tenn., which included two Whiting cupolas, a Root blower and elevator, together with the complete paraphernalia requisite for a 50-ton foundry.

The Novelty Iron Works, Dubuque, Iowa, report that trade has been unusually good with them until recently, when it began to lighten up somewhat. Inquiries are coming in quite plentifully, but they do not look for a large trade during the summer months.

The Stover Mfg. Company, manufacturers of wind mills,

builders' and special hardware, Freeport, Ill., report orders as being good and the prospect for a continuance of business fair.

The Philadelphia Machinery Market.

PHILADELPHIA, May 27, 1904.

The Philadelphia machinery market during the past month has been a disappointment to many in the trade. Business has failed to recover as was anticipated, and comparison with April's business shows that the trade has not much more than held its own. Exceptions are to be noted in isolated cases where gains have been made, but more cases are to be found where the volume of new business has diminished. With existing conditions there is little prospect of any improvement in demand in the near future. It will be well if sufficient day-to-day business comes in so as to enable plants to be operated satisfactorily over the summer months.

Large buyers are deferring orders wherever and whenever possible; the railroads, usually heavy purchasers of machinery and tools, are not coming into the market, and are in many cases curtailing contemplated improvements. New operations are few; some notable steel casting plants at Chester, Pa., and New Castle, Del., are nearing completion, but almost nothing is doing in absolutely new projects. Many plants are at present being operated with reduced forces, and on short time; it is nothing unusual to learn that this or that plant has been placed on four or five days' time. The large plants, which in recent years have materially increased their facilities, naturally feel the effect of weakening demand more than the smaller plants, although they have begun to feel the same condition more or less. Most of the orders placed during the past month have been for single tools; small machines and tools have, as a rule, been in the best demand. Here and there sales of large machine tools are made, but they are not frequent, buyers taking only what is absolutely necessary for their requirements, and no matter how interesting a proposition is made, the deal is more likely to be turned down than consummated. Inquiries in nearly all lines kept up well during the first half of the month, but since then they have steadily declined, and the end of the month in some lines finds inquiries most unsatisfactory. There are exceptions, of course, and in some plants the estimating departments are kept quite busy. It is likely, however, that the present inactivity in inquiries is only temporary, and while a brisk demand is hardly looked for at the time, it is probable that conditions will continue more or less spotty, that condition being already in evidence in some lines, where for a few days' demand will be good, then fall off entirely, to recover again in the next few days. Under present conditions, deliveries can naturally be made with great promptness on nearly all classes of tools. Warehouses have stocks of both medium, and smaller standard machine tools, and, in cases, even of the larger and heavier tools on which immediate delivery can be made. Manufacturers of special tools and heavy machinery can, as a rule, begin almost immediate work on such goods, and as castings and other supplies are in good supply, early delivery on this class of work can also be made.

The foreign demand is unchanged; in some lines, notably pneumatic tools, orders have increased but in machine tools and general machinery, there is no indication of any immediate resumption. Conditions abroad are generally said to be unfavorable for extensive demand, and costs of materials and labor in this country are too high to enable manufacturers to compete with foreign made machinery and tools.

Castings, both iron and steel, can be had promptly. A few foundries are quite busy, but a number of others are dull and running more or less irregularly. Orders for castings are being strenuously sought, and prices are said to be made according to how badly the work is needed. The labor question in some foundries is still unsatisfactory.

Machine tools and machinery dealers have, as a rule, had an unsatisfactory month. During the early weeks it was in most instances dull followed by a material improvement, which, however, fell off largely toward the end of the month. Sales have with a few exceptions been confined to small tools; an occasional sale of a boring mill or a large drill press is mentioned as a feature, and helps materially in the total of a month's sales. Floors are well stocked and deliv-

eries promptly made. Inquiries during the latter half of the month are said to have fallen off considerably.

There has been little change in the matter of prices. In some cases list and discounts are being maintained, in others prices are made to suit the case. Price is considered quite a factor in present day purchasing, and a slight concession is sometimes sufficient to close a contract.

The Meade Cornice & Roofing Company are building a new plant at Forty-fifth street and Woodland avenue, where they have acquired ground, 100 x 300 feet. They will erect a cornice and sheet metal working shop, which will be modern in every particular; the main building will be 65 x 200 feet, and the store room, tin shop and smith shop, which adjoin the main building, will occupy a space of 20 x 260 feet.

The Eynon-Evans Mfg. Company are making a considerable addition to their foundry, orders for brass and acid resisting bronze castings being quite numerous, that department being rushed with work. Their machine and pattern shops, however, are not so busy, but a good amount of business is in hand.

The Nazel Engineering & Machine Company report a fair demand for their improved centering machines and portable drills, both from domestic and foreign sources, a number of inquiries having been recently received from several points in South America. Deliveries continue to various local and out of town parties, and conditions for future trade are considered favorable.

The Espen-Lucas Machine Works continue fairly busy. While the immediate demand is probably easier, a number of orders are in hand and sufficient to keep them running for some time. Recent deliveries include cold saw cutting off machines for delivery to New Jersey, New England and to local parties. Delivery has also been made on large special floor boring machines.

The Hess Machine Works have recently shipped several sets of file making machines for export to Germany, and one set for export to Sweden. A fair demand for these machines continues from these and other Continental countries, but the domestic demand is weak.

The Earle Gear & Machine Company continue moderately active, orders for a number of medium sized special gears having recently been received. These parties have lately installed several additional tools, and are equipped for all classes of gear cutting. Some large as well as medium and small gears have been shipped their various customers.

Dienelt & Eisenhardt keep busy in their machine department, where several large oil cloth printing machines, expanding machines and special tools are in course of construction. They are not as active, however, in the foundry, the demand for castings having weakened considerably. New business comes in slowly, but sufficient work is on hand to keep them running for some time. The demand for hammers and hydraulic jacks has not materially improved, a number of the latter, however, have been shipped to several railway companies.

Lovegrove & Co., Incorporated, while they have been estimating on a large quantity of work during the past month, have noted a decline in the number of orders when compared with April. They have installed a number of small plants, and furnished the A. Colburn Company of this city with a 150 horse-power Corliss engine, two 60 x 16 feet 80 horse-power boilers and stack complete. A steam plant for thawing coal frozen in cars, so that it may be readily unloaded, has recently been installed by them for Downing Bros. of this city.

The Falkenau-Sinclair Company have recently shipped via New York for export to Manila, Philippine Islands, one of their standard No. 4 straight sided presses. Deliveries of various other presses to both local and distant countries are also to be noted. Cement testing machines have been shipped to several railroad companies, to the United States Government and to several colleges. A special new type washer press has also been delivered to parties in Wilmington, Del. While the company have considerable work on hand, new business comes in slowly. A large number of estimates are in course of preparation, but inquiry during the latter portion of the month is somewhat diminished.

The Riehle Bros. Testing Machine Company have recently received an order for a vertical screw power testing machine of 600,000 pounds capacity for the University of Illinois. Special features, it is said, will be introduced in this machine. Recent deliveries mentioned by the above parties include a 300,000-pound car Bolster testing machine, a 100,000-pound spring tester and a 75,000-pound closing press, all for the Simplex Railway Appliance Company, Hammond, Ind., and a 200,000-pound testing and torsional machine has been delivered to Lafayette College, Easton, Pa.

The Philadelphia Pneumatic Tool Company continue very busy, and are running their plant overtime to meet the demand for pneumatic tools. Orders for a large number of tools have been received for export to Germany, France and Belgium. These orders cover a general range of tools, and are intended in some instances for use in structural iron work. The domestic demand holds its own, coming largely from the boiler and machine shops. One recent order taken

was from the United States Government for a number of chipping hammers for delivery to the Mare Island Navy Yard, San Francisco, Cal.

The Philadelphia Roll & Machine Company report business fairly good. There is a promising demand for rolls, both chilled and sand cast, and several nice orders have been taken, one being for two 36-inch rolls, weighing 40,000 pounds each. Shipments of rolls continue to many of the large steel and iron rolling mills in the eastern portion of the United States.

Business with the American Pulley Company averages about the same as last month, both as regards foreign and domestic requirements. Their plant continues in active operation, and shipments were recently made for export to New Zealand and Australia. Domestic deliveries include carload shipments to Southern and Western points. The local demand has only been fair.

The Link-Belt Engineering Company report a good volume of general business throughout the month. Inquiries are numerous, and the estimating department is quite busy. Among recent orders taken by them was one for a complete elevating and conveying system for the Bath Portland Cement Company, Bath, Pa.; the Robt. H. Foerderer Company, Incorporated, Philadelphia, have ordered conveying and handling machinery for work in wet hair, and the Wilson Distillery Company, Baltimore, Md., have ordered special apparatus for handling bottles.

The Energy Elevator Company have experienced no difficulty in continuing their work promptly, notwithstanding the strike of the elevator erectors in this territory. A fair volume of business continues to come in, and inquiries are generally satisfactory. Orders have recently been received for a large electric freight elevator for Jacob Reed's Sons, 1422 Chestnut street, this city, and a number of hand power elevators have also been booked for other local parties. Shipments include a power freight elevator for Burlington, Vt.; hand power elevators have been shipped to Springfield, Mass.; Atlantic City, N. J.; Saginaw, Mich.; Reading, Pa.; Williamsport, Pa.; Warrington, W. Va.; Charlottesville, Va., and to the Agricultural School at Kingston, L. I.

The Alfred Box Company, Incorporated, have started work on their new girder shop at the northeast corner of Front and Poplar streets, previously reported in these columns. This shop will be equipped with four of their own electric traveling cranes, 10 tons capacity each, two on a runway. Business with the company has been quite satisfactory. Orders have recently been booked for a two-motor electric jib crane for the Delaware Foundry Company, Burlington, N. J.; a 10-ton hand power traveling crane with runways and columns complete for the Ferrofix Brazing Company of this city; two 50-ton, four-motor traveling cranes for the New York Central & Hudson River Railroad, one being for their electric power station at Yonkers, N. Y., and one for the Port Morris station; a 30-ton electric traveling crane has also been ordered by R. S. Newbold & Sons Company, Norristown, Pa. Recent deliveries made by the Box Company include four electric traveling cranes, two 10 tons and two 5 tons capacity for the General Electric Company's Schenectady, N. Y., plant, which complete an order for 16 cranes placed with them by this company. A set of special machinery has also been shipped the "Coasting Through Switzerland" Company, Coney Island, N. Y., and a 5-ton hand power jib crane has been delivered to the D. A. Walters Company, Fifteenth and Hamilton streets, this city. A 10-ton hand power traveling crane with runways complete for Building No. 22, Brooklyn Navy Yard, for the United States Government has been completed, as has also a 20-ton hand power traveling crane for the Weehawken Power Station of the New York Central & Hudson Railroad.

The Tabor Mfg. Company have had a very good month's business, in fact, the best in the history of the company. A large number of orders for molding machines have been booked from various sections of the country. In Utica, N. Y., orders for 26 machines alone have been taken, including jar ramming machines, vibrator frame and hand and power ramming machines, several of which are of large size. Inquiries continue good, and considerable further business is in sight. Recent deliveries by them include jar ramming machines for the American Locomotive Company, Schenectady, N. Y., and the Baldwin Locomotive Works in this city.

The Baldwin Locomotive Works note a lighter demand for locomotives, the various railroads in many cases deferring orders for engines in any quantity. The foreign demand is practically in abeyance, business conditions abroad being unsatisfactory in many countries, and the cost of raw materials makes cost of manufacture here prohibitive for competition. Most of the orders received are confined to single engines or for small lots at the most. Shipments recently include deliveries on orders from the Atchison, Topeka & Santa Fe Railroad and final shipments on 35 engines, 25 consolidated and 10 Prairie type, for the Southern Railway have been made. Work in hand, some of which is nearing completion, includes 50 locomotives of various types for the Chicago, Burlington & Quincy Railway, and a number of double end engines for the Philadelphia & Reading.

The Royersford Foundry & Machine Company, Royersford, Pa., have recently shipped three No. 3 combined punch and shearing machines to New York parties, and have received orders for several other tools. A fair inquiry continues, but business is not as active as it might be. In the foundry department they have a line of work which keeps them running nearly to their capacity.

Iron and Industrial Stocks.

Nothing occurred the past week either to inspire enthusiasm or to excite serious apprehension. The market was dull, with no special tendency either up or down. Fluctuations were within quite narrow limits. On Tuesday of this week the United States Steel stocks showed some disposition to decline, but recovered before the close. A plan to reorganize the United States Realty & Construction Company was announced, which had little effect on the company's stock. It is proposed to form a new corporation with a capital of \$30,000,000, against the old capital of \$30,000,000 preferred and \$36,000,000 common. The stockholders are to get for every share of preferred stock one-twentieth of a \$1000 5 per cent. bond and 85-200 of a share of stock, and for every share of the common stock 15-100 of a share of new stock. The issue of bonds will amount to \$13,506,000. Last transactions in active stocks up to 1.30 p.m. on Wednesday were as follows: Car & Foundry common 16½, preferred 70; Locomotive common 18½, preferred 81; Colorado Fuel & Iron, 29; Pressed Steel common 25, preferred 67; Railway Spring common 16½, preferred 73; Republic Iron & Steel common 6½, preferred 38; Sloss-Sheffield Steel & Iron common 36, preferred 82; Tennessee Coal & Iron, 33¾; United States Steel common 9, preferred 53¾, and new 5's 73¾.

The annual meeting of the stockholders of the William Cramp & Sons Ship & Engine Building Company was held May 26. The old Board of Directors was re-elected. The annual report showed a surplus after interest, &c., of \$188,174, which compares with \$179,198 last year. In the latter year, however, \$121,200 was paid out in dividends, so that this year's surplus is really about \$112,000 less than that of 1903. The financial report follows:

	1904.	1903.
Gross earnings.....	\$7,107,082	\$8,519,169
Profit over cost of material, labor, &c..	735,031	696,497
Net, after general expenses, interest, &c.	188,174	300,398
Dividends		121,200
Surplus	188,174	179,198

The profit and loss account of the company as of April 30, 1904, shows: Gross from shipbuilding, \$4,818,917; gross from other departments, \$2,288,165; total gross, \$7,107,082; operating expenses, \$6,372,060; balance, \$735,031; general miscellaneous expenses, \$170,573; net profit, \$564,457; income from other sources, including interest on deposits and discounts for cash on material bills, \$25,608; total net profit, \$590,066; fixed charges, interest, &c., \$401,891; surplus, \$188,174.

Dividends.—Railway Steel Spring Company have declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, payable June 20.

National Enameling & Stamping Company have declared the regular quarterly dividend of 1¼ per cent. on the preferred stock, and 1 per cent. on the common stock, payable July 1.

Great Electric Locomotives for New York.

The electric locomotives which are to be used for operating the trains of the New York Central and New York, New Haven & Hartford railroads within a radius of 50 miles of New York, and which are being built at the Schenectady shops of the General Electric and American Locomotive companies, will have a capacity of 2200 horse-power each. The present large steam locomotives which haul the Empire State Express have an indicated horse-power of 1500 when running at a speed of 60 miles an hour. These electric locomotives, of which about 30 were ordered, are of an entirely new design, will weigh 85 tons each, with an adhesive weight on the drivers of 67 tons, and will be capable of hauling a train of 500 tons at a speed of over 60 miles an hour. The locomotive will be a double ender, running equally in either direction, and will have four motors of 550 horse-power each. The motors will have only two magnetic poles, instead of four, the usual number in railway motors, and the armature of each motor, instead of working through gearing, will be pressed solidly on the axle, having been previously assembled on a quill for this purpose. The Sprague-General Electric multiple unit control will be installed on all the engines, so that two or more of them can be coupled together and run by a single motorman.

HARDWARE.

THERE is reason to hope that something earnest and practicable will be attempted for the protection of the trade in view of the extent and methods of the catalogue house business. The subject was for the first time officially and broadly discussed at Atlanta at a representative conference of trade interests. At this assembly of organizations and independent jobbers the fact was formally considered in its various aspects and relations, and as thoroughly and comprehensively as could be expected at the present stage of the movement. Those in touch with the feeling of the merchants and manufacturers in attendance at the convention are impressed, first of all, by the unanimity of opinion on the part of retailers, jobbers and manufacturers that the growth of the catalogue house as it has been conducted is a serious menace primarily to the interest of the retailer, then almost as directly militating against the welfare of the jobber and ultimately reacting against the manufacturer. On this point there seemed to be no difference of opinion. This general consensus of judgment on the part of the various great divisions of the trade is certainly an encouraging sign, and should furnish a basis for effective action.

The conservative spirit which characterized the expressions of the delegates at Atlanta was another noticeable feature. Extreme views, if entertained, did not find voice. There was no disposition to condemn as illegitimate the selling of goods by means of catalogues, even to consumers, for this is done by both jobbers and retailers. There was no suggestion that efforts should be made to drive the catalogue houses out of business. They were recognized as having a right to exist and to market goods by means of their catalogues, provided only and always that they do this in legitimate ways. In this view the Atlanta conventions were but following the lead of the retail Hardware merchants, who have been the prime movers in the campaign against such houses. This sane and rational way of regarding the problem cannot but commend itself to those who desire a mitigation of the evils and disturbances which are connected with the method under consideration. The absence of irrational and impracticable views lends strength to the hope that approaching the matter wisely and with the unanimity of approval on the part of the trade which can only go with reasonable and temperate efforts much may be accomplished for the mitigation of existing evils.

In connection with this balanced view of the subject and the recognition of the theoretical rights of catalogue houses to do business there was a general, if not universal, recognition of the disturbance of catalogue house competition, and the duty on the part of all departments of the trade to unite in efforts to meet such competition for the protection of the trade. Instead of a willingness to let the new competition continue practically unopposed, as heretofore, it was regarded as the part of wisdom for the trade to unite in efforts to correct the evils and limit as far as possible the influence of catalogue houses. There was, in short, a recognition of these houses as competitors who are to be met and opposed in a spirit of self-defence for the protection of the public and the trade alike. Just how this can best be done is a matter for future deliberation. It will be considered by the joint committees which have been appointed to take official charge of the movement. That the problem is not an

easy one is admitted, but what has been already accomplished by some manufacturers leads to the hope that the organized effort will accomplish much. The fact that the great independent jobbing houses refuse to be made the channels through which the catalogue houses obtain their goods is significant and promising. If other jobbing houses would follow their example and come out in explicit statements to the same effect it would be a further step in advance.

With able committees from the NATIONAL RETAIL HARDWARE DEALERS' ASSOCIATION, the NATIONAL HARDWARE ASSOCIATION and the SOUTHERN HARDWARE JOBBERS' ASSOCIATION working together to find a solution of the problem and to recommend action and exert influence for the repression of whatever is illegitimate in the methods of the new competition, there is a prospect that something will be done. It is to be hoped, too, that those in charge of the movement may see the wisdom of accepting the co-operation of the great outside jobbers, who are apparently as sincerely desirous as any of the success of this movement, and whose active and accepted co-operation as distinguished from their sympathy merely would add to the efficiency of the effort. The reported refusal to accept the co-operation of these independent jobbers was frequently commented upon at the Atlanta gathering, especially by the manufacturers, as unwise and robbing the movement of weight which it might possess. There is reason, however, to hope that a way may be found by which the co-operation which these houses are willing to give may be utilized for the furtherance of the cause. However this may be, it is a matter for congratulation that under very favorable auspices the movement taken up years ago by retail merchants is under way with the hearty approval of manufacturers and jobbers. It is entitled to the sympathy of all in the trade, and we bespeak for it the countenance and help of all merchants and manufacturers. All should fall in line and give the effort their intelligent and earnest support.

What is said in the preceding paragraphs refers to organized efforts. Very noticeable at the Atlanta conventions was the recognition of the fact, to which we have directed attention repeatedly, that this new competition calls upon retail merchants to adopt energetic, enterprising and even aggressive efforts in the prosecution of their business. Alertness, intelligence and push on their part should go before, accompany and supplement anything attempted in the line of organized efforts. This was the keynote of much that was said at Atlanta, and its justice is generally recognized. It is a phase of the subject which demands the most careful consideration on the part of retail merchants. We have confidence that they will realize the opportunity and responsibility and vindicate their position as the most intelligent of merchants, ready to adopt progressive methods and keep step with the progress of the times.

Condition of Trade.

The trade throughout the country is giving evidence of the coming of summer, as seasonable goods are those most in demand, but with general lines moving in fair volume so far as the trade of retail merchants is concerned. There is something of a lull in the general market, as the demand for goods is moderate, as a result of the conservative spirit which directs the buying in jobbing houses and among the retail trade as well. The

course of the market in raw material is watched with solicitude, and indications are observed from time to time of a softening of prices of one or another line of Hardware, especially in heavy goods. Manufacturers are running their plants under less pressure than during the recent years, and some of them are experiencing both the satisfaction and the dissatisfaction connected with accumulating stocks. The deliberations of the Atlanta conventions, such full reports of which were given in our last issue, have been followed by the trade at large with special interest, and the catalogue house question is receiving more attention from merchants and manufacturers than ever before. As the quiet time of year approaches it will be well for merchants, wholesale or retail, to consider their methods and make plans for future enterprise in something the same spirit as manufacturers are accustomed to overhaul their plants and get everything into shape for future business.

Chicago

(By Telegraph.)

The few days of relief from the cold Northern winds which have prevailed throughout the West were reflected in active buying in Hardware Thursday, Friday and Saturday of last week, but the bitter cold of Sunday, Monday and Tuesday has chilled this buying movement and trade is quiet again. The Hardwareman's trade is a barometer, that rises or falls with favorable or unfavorable weather conditions almost instantly. Crop conditions continue to be favorable, and there is every reason to look forward to a good fall jobbing trade, as judged by the comparative readiness with which Hardware dealers are persuaded to anticipate their needs. An improvement in demand for Wire Cloth, Lawn Mowers, Garden Tools, Garden Hose and similar warm weather merchandise came with the few days of favorable weather, and the same influence favorably affected Nails and Wire products. Builders' Hardware is moving satisfactorily in comparison with other Hardware lines, although hardly so in comparison with previous years, and the war of prices between the leading Builders' Hardware firms and the multitude of independents on small lines like Brass Window Catches, Hinges and Butts, upon which competition is widespread, is unabated, all crying loudly that present prices are below the cost of manufacture, but none refusing to take business for that reason.

Philadelphia.

SUPPLIEE HARDWARE COMPANY.—Trade during the past two weeks has about maintained the condition of the preceding two weeks. The weather has recently been fine for growing crops, and consequently trade for spring season goods has been fairly active. There has been some uneasiness felt concerning the continuation of good trade in industrial locations. Perhaps that is owing to some manufacturers being more nearly up with their orders, while during the past two years they have looked upon back or unfilled orders as evidence of a maximum trade. This, we presume, is but natural, but it should be taken into consideration that when manufacturers are far behind on their order books jobbers necessarily must anticipate their coming wants by placing orders considerably in advance of their needs, while when trade is more nearly normal they naturally give less time to manufacturers to fill their orders.

The Hardware industries are apparently much more active than some other industries. There is a dropping off of men in the textile industries, there is a dropping off of men by the railroad companies, and if this should increase, or even continue, districts that are dependent upon general daily trade might feel the effects. It must be taken into account, however, that we have two or three months of summer weather and sufficient time between this and fall for conditions to change. The crops of the country must have an effect upon the trade of the fall.

St. Louis.

NORVELL-SHAPLEIGH HARDWARE COMPANY.—Daily orders are more numerous than last year, but are running smaller. This is especially noticeable in the mail order department. The large number of mail orders being received for a few items each indicates a hand to mouth buying policy just at this season on the part of the retail trade.

The catalogue house question continues to absorb the attention of manufacturers, jobbers and retailers. The members of the National Hardware Association, composing almost 200 prominent jobbers in this country, have assured their officers that they will not supply catalogue houses with goods. Not a catalogue house can buy a dollar's worth of goods from any Hardware jobber in the city of St. Louis. Prominent jobbers have hastened to advise their customers that they "do not sell and have never sold" catalogue houses. Some rather fine distinctions are being drawn. One jobber stated that filling the "pick up" orders from a catalogue house could not be classed as selling them.

The writer is told that one well-known catalogue house that has drawn its supplies almost entirely from jobbers has decided to discontinue the Hardware part of its business, as it has the alternative of either closing out its line of Hardware or of purchasing from the manufacturers a complete stock as illustrated in its catalogue. Naturally the manufacturers do not desire orders for trifling quantities. To purchase this great variety of goods, in even moderate quantities, from all the various manufacturers, would mean a heavy outlay of capital, followed by the great uncertainty and irregularity of mail order sales. Probably, also, just at the present time quite a number of manufacturers would not care to open an account with this catalogue house. There is no doubt whatever but that jobbers have been largely helpful to catalogue houses, especially in their beginnings. It is to be hoped that all the various phases of this question have been so thoroughly ventilated that all the jobbers in the country will show their sincerity by their actions in not selling to or not filling the "pick up" orders of catalogue houses.

It is truly wonderful what a unanimity of opinion has suddenly developed among jobbers on this subject. It is remarkable to note how long and arduously, but "quietly," so many jobbers have been working on this same catalogue house question, in many cases for "years and years." Jes' so! Jes' so! Some of us freely admit our shortcomings. We admit that we have not "quietly" been working on this subject for "years and years." We just woke up, as it were, with a start, and gave our impressions of the situation. No one has been any more surprised at the results of our letter of April 7 than ourselves. But the most surprising of all has been the discovery of the great amount of work that has been "quietly" done by so many other jobbers on this same subject.

Isn't there just a little humor in the situation? Is it well to always be so ponderously serious? We have been made to feel that we owed apologies to some of our fellow jobbers for so rudely interrupting the "quiet" work they were doing. Probably after all "there is a destiny that shapes our ends," and that in this case we simply happened to be the instrument selected by Providence to cause an awakening. Now that all of us have awakened let us hope we will all work together in good fellowship and harmony, and, above all, let us hope that in our proceedings we will have just a little of the divine sense of humor, because an appreciation of the amusing side of things is a great help in getting at the true proportions of life.

Baltimore.

CARLIN & FULTON.—The demand for goods at the present time is comparatively light as to our Southern market, though no more so than has always been the case, the month of June being generally one of the dullest in the year. Trade at present is confined mostly to the demands of our immediate vicinity, and mostly for seasonable goods. Locally quite a number of contracts have been

placed for rebuilding property destroyed by the great fire in February, but operations have been greatly hindered by the delays in our legislative bodies and the discussions of new grades and the widening of streets and condemnation of property, and a great many questions no doubt absolutely necessary, but most vexatious. There is an immense amount of work yet to be done, though real estate owners are considering very seriously the questions of higher costs of both material and labor.

The general conditions of the market are very good. The season has been backward, owing to the late spring, but the cold weather has protected the fruit, which promises a large yield, and wheat looks well, with the indications of a large harvest. The truckers are getting quite busy, and generally speaking the agricultural community is in a healthy state, the benefit of which will be felt when the time for fall business arrives.

Cleveland.

THE W. BINGHAM COMPANY.—The outlook for continued good trade right through the season is very hopeful. The merchants in Ohio are carrying well assorted stocks of goods. Just at present the farmers are busy planting, but they come into the towns and villages in the afternoon and evening and there is a lot of trading being done. From our observation and talk with customers, they are in good spirits and the majority of them are enjoying a satisfactory trade. Of course, the long, cold winter stopped operations of the farmer, but now that splendid growing weather is with us they forget their idle months when they could not make improvements and are getting at them in a hurry.

A great many orders for Nails and Wire have been going forward in the last 30 days, and there is considerable new inquiry. Spring goods of all kinds are moving freely. Cleveland jobbers are well supplied and have well assorted stocks of Hand and Horse Lawn Mowers, Refrigerators, Garden and Lawn Rakes, Hoes, Manure Forks, Shovels and Spades of all kinds; also Handles and Ice Cream Freezers. A lot of orders are being booked for Elbows, Coal Hods, Stove Boards, Axes, Meat Choppers and Stuffers for fall shipment.

There is a lot of cheap truck on the market, but the trade and the housekeeper are getting very tired of it, and our experience is that better makes of all classes of goods are going to predominate in the future, especially with the better class of trade, who like to sell goods that will give good value to the users.

A smart trade is coming to us from up the lakes, and as soon as the present cloud or disagreement between the vessel owners and masters disappears we will have a lot of business from the West and Northwest to take care of, and it will come to us in a rush. We were hoping to take care of some of this business earlier, but many orders are being held up on account of uncertainty of lake freight movements. We hope this trouble will disappear very soon. Collections are quite fair and satisfactory.

Nashville.

GRAY & DUDLEY HARDWARE COMPANY.—This is about the most quiet time of the year for the Hardware jobbers in the South. At present nearly all houses are invoicing stock, and a good many of the traveling men are off the road. It seems to be the general opinion that the past 12 months have been very satisfactory, and while the profit account will probably not be as large as it has been during some other years, it will be sufficient to pay dividends and put something to the surplus fund.

The recent convention of the Southern Hardware Jobbers' Association held in Atlanta was about the most interesting and important meeting of this association ever held. It was largely attended by the members, and in addition to this many prominent Hardware men from all over the country were present at the meeting.

The crop conditions throughout the South generally are excellent, and there has been a wonderful improvement in the condition of the wheat, corn and cotton crops during the past 30 days. We believe that business during the summer and fall months will be fully up to the

standard, and possibly better than last year. Collections continue to be unusually good.

Omaha.

LEE-GLASS-ANDRESEN HARDWARE COMPANY.—In this section of the country the weather is the principal influence immediately affecting trade. Owing to continued changeable and cool weather the usual spring conditions have been disturbed and are practically three weeks behind the normal. The agricultural communities are taking prompt advantage of every favorable opportunity to accomplish the necessary field work, consequently trading in the country towns is lighter than it otherwise would be. The general volume of business, however, continues to be very fair, though not enough to be elated over. The entire Western country never looked better at this season of the year. Frequent rains have moistened the soil until this important feature is declared to be in the best possible condition, and it is predicted that the acreage under cultivation will exceed all past records. With anything like a favorable season from now on Nebraska and Kansas will harvest another great crop, and if the market prices are reasonably sustained a very heavy fall business will be sure to develop.

Portland, Oregon.

CORRETT, FAILING & ROBERTSON.—There has been a decided improvement in volume of trade offering the past three weeks, owing to change in weather. The Government report issued to-day makes a favorable showing for growing crops in the Pacific Northwest. Ranges are in fine condition and stock doing well.

Our most serious handicap in this section is the depression in lumber and shingle business, and the present outlook is for a worse rather than better condition in the near future. Collections have not improved with weather and are still in *statu quo*.

NOTES ON PRICES.

Wire Nails.—The market is quiet, with a limited demand, incident to the season, and remains firm in tone. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carload lots.....	\$1.90
Retailers, carload lots.....	1.95
Retailers, less than carload lots.....	2.05

New York.—Local demand for small lots from store keeps up remarkably well considering general conditions. Quotations are as follows: Single carloads, \$2.10; small lots from store, \$2.20.

Chicago.—Prices are unchanged, as follows: Carload lots to jobbers, \$2.10 per 100 pounds; less than carloads to jobbers, \$2.15 per 100 pounds; carloads to retailers, \$2.15 per 100 pounds; less than carloads to retailers, \$2.25 per 100 pounds, all f.o.b. Chicago.

Pittsburgh.—Demand for Wire Nails is quiet, as it always is at this season of the year, but the mills have many contract orders yet on their books which will take some time to fill. Deliveries are now reasonably prompt, the mills having caught up to some extent on back orders. Prices in the main are being well maintained. Wire Nails, \$1.90 in carloads to jobbers, \$1.95 in carloads to retailers, and \$2 to \$2.05 in small lots to retailers, all f.o.b. Pittsburgh, 60 days, or 2 per cent. off for cash in 10 days, plus actual rate of freight to point of delivery.

Cut Nails.—There is nothing new to report in regard to demand, which continues moderate. It is understood that an outside mill is offering slightly lower prices, but that some of the Eastern representatives of association mills are not meeting the competition. Quotations are as follows for Steel and Iron Nails, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Base.
Jobbers, carload lots.....	\$1.75
Jobbers, less than carloads.....	1.80
Retailers, less than carloads.....	1.90

New York.—The tone of the local market is firm, with a moderate demand. Quotations are as follows: Carloads on dock, \$1.89½; less than carloads on dock, \$1.97½; small lots from store, \$2.05.

Chicago.—Prices are as follows: Carload lots, both Iron and Steel Nails, Chicago, to jobbers, \$1.91½, base; less than carloads, \$1.96½. Retailers and large consumers pay 10 cents per 100 pounds above jobbers' prices. Jobbers sell at from \$2.10 to \$2.30, base, f.o.b. Chicago warehouse, according to customer, size of order, &c.

Pittsburgh.—New business in Cut Nails is rather quiet, consumers having covered their wants for some time to come. There is some unevenness in prices of Cut Nails for certain points of delivery. We quote Steel and Iron Cut Nails at \$1.75, base, in carload lots, and \$1.80 in less than carloads, f.o.b. mill, terms 60 days, less 2 per cent. off in 10 days.

Barb Wire.—The mills are kept busy filling contract orders rather than with new business, which is light. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carload lots.....	\$2.20	\$2.50
Retailers, carload lots.....	2.25	2.55
Retailers, less than carload lots.....	2.35	2.65

Chicago.—Prices are unchanged, as follows: Carload lots, Painted Wire, \$2.40; Galvanized, \$2.70; to retailers, carload lots, Painted, \$2.45; Galvanized, \$2.75; to retailers, less than carload lots, Painted, \$2.55; Galvanized, \$2.85; Staples to jobbers, \$2.25 for Plain and \$2.65 for Galvanized, with 5 cents advance to retailers.

Pittsburgh.—New demand is light, but the mills still have a good many contracts on their books which will require some time to fill. Prices are fairly firm, but without special change. Quotations are as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days:

	Painted.	Galv.
Jobbers, carloads.....	\$2.20	\$2.50
Retailers, carloads.....	2.25	2.55
Less than carloads.....	2.35	2.65

Smooth Fence Wire.—Current demand and unfilled orders are keeping mills well employed. Quotations are as follows, f.o.b. Pittsburgh, 60 days, or 2 per cent. discount for cash in 10 days:

Jobbers, carloads.....	\$1.80
Retailers, carloads.....	1.85
Less than carloads.....	1.95

The above prices are for base numbers, 6 to 9. The other numbers of Plain and Galvanized Wire take the usual advances, as follows:

	6 to 9	10	11	12	12½	13	14	15	16
AnnealedBase.	\$0.05	.10	.15	.25	.35	.45	.55		
Galvanized....	\$0.30	.35	.40	.45	.55	.65	1.05	1.15	

Chicago.—Prices remain as follows: Smooth Fence Wire, sizes 6 to 9, \$2 per 100 pounds in carload lots to jobbers, f.o.b. Chicago; \$2.05 per 100 pounds to retailers in carload lots and \$2.10 in less than car lots.

Pittsburgh.—New demand is fairly good, and with unfilled contracts still on the books of the mills insures steady operation for some time to come. We quote as follows, f.o.b. Pittsburgh, terms 60 days, or 2 per cent. discount for cash in 10 days: Plain Wire, \$1.80, base, for Nos. 6 to 9, in carloads to jobbers, and \$1.95 to \$2 in small lots to retailers; Galvanized, 30 cents extra for Nos. 6 to 14.

Pumps.—The National Association of Cast Iron Pump Manufacturers was organized at a meeting held in Chicago on the 25th ult. The following manufacturers were represented at the meeting: Humphreys Mfg. Company, F. E. Myers & Bro., Barnes Mfg. Company, Temple Pump Company, Mast, Foos & Co., Flint & Walling Mfg. Company, Moline Pump Company, Red Jacket Mfg. Company, J. E. Porter Company, Duplex Mfg. Company, Cedar Rapids Pump Company, Dempster Mill & Mfg. Company, Challenge Wind Mill & Pump Company. F. E. Myers was elected president; H. J. Parks, vice-president; T. R. Barnes, secretary, and E. H. Sleight, treasurer. It is understood that practically all of the Pump manufacturers are heartily in favor of the organization. The association will consider the matter of freights and other grievances from which the manufacturers are now suffering. While no definite action has been taken in regard to prices and no advance has been determined on, the

manufacturers generally are disposed to consider present quotations as too low. Another meeting of the association will be held in Chicago in about 30 days, monthly meetings being continued until the organization is in good working order, when quarterly assemblies will be held. All of the manufacturers represented at the meeting reported an exceptionally good demand for their products.

Binder Twine.—The possibility of smaller requirements than had been estimated and the reported disposition of a few independent manufacturers to quote less than the schedule price has made it difficult to close all of the priceless orders which had been taken. The large total supply of Twine is estimated as greater than the country will require this season, and is not considered as conducive to a continued firm market. The International Harvester Company's prices, which are as follows, are generally adhered to:

	Cents per lb.
Sisal	10¼
Standard	10¾
Standard Manila (550 feet).....	11¼
Manila (600 feet).....	12¼
Pure Manila (650 feet).....	13¼

Five-ton lots, ¼ cent less; carload lots, ¼ cent less. Kansas City, Minneapolis, Omaha, Council Bluffs, ¼ cent higher, Pacific Coast points, 1 cent higher. Eastern prices are, as a rule, ¼ cent less.

Oils.—*Linseed Oil.*—Demand is largely confined to small lots, the call for which is moderate. Quotations are as follows: City Raw, in lots of five barrels or more, 40 cents per gallon; in lots of less than five barrels, 41 cents per gallon; State and Western Raw, 37 to 38 cents per gallon. *Bolled Oil*, the usual 2 cents advance per gallon over Raw.

Sheet Zinc.—Under date of May 28 Matthiessen & Hegeler Zinc Company, La Salle, Ill., announce the price of Sheet Zinc as \$6.00 per 100 pounds in 600-pound casks, f.o.b. La Salle.

THE HARDWARE CLUB OF NEW YORK.

THE tenth anniversary of the Hardware Club of New York was celebrated to-day, Wednesday, in an informal manner. The rooms were tastefully and effectively decorated with flags and flowers, and refreshments furnished the members and a special souvenir menu provided, giving the names of the Board of Governors at the organization of the club and at the present time. The governors in their official capacity extended courtesies to the members. Many congratulations were expressed on the prosperity which has attended the club during its entire history.

WEED & CO.'S FIRE.

THE large establishment of Weed & Co., Buffalo, N. Y., was damaged by fire on the morning of the 28th ult. to the extent of nearly \$30,000, fully covered by insurance. Through the especially efficient work of the fire department the flames were confined to the basement. The fire broke out at 4.45 a.m., and four hours later, owing to the effective efforts of the employees, the store was open for business, only 15 minutes behind the usual time. In the afternoon the matter of insurance was quickly settled.

J. C. Birge, president of the American Hardware Manufacturers' Association, made an admirable presiding officer and directed the work of the organization with distinction. His strong and cultured personality, the felicity of his introductions and incidental remarks or addresses, and the ability and eloquence of his more formal utterances contributed to his success and popularity.

Yale & Towne Mfg. Company made a fine exhibit of their Yale Locks, Builders' Hardware and Art Metal Work. J. H. Towne, general manager, was in charge, assisted by A. W. Clark, manager of sales department, and J. B. Parrent, their Southern representative.

THE ATLANTA CONVENTIONS.

CONCLUDING REPORT.

THAT the conventions of the Southern Hardware Jobbers' Association and the American Hardware Manufacturers' Association held last week in Atlanta were among the most successful of any in the history of the two organizations is admitted by all who attended them. The gathering was large and representative, more representative in fact in some respects than any recent gathering of the trade, owing to the presence of gentlemen prominently connected with the great independent jobbing houses who are not identified with any of the various associations of wholesale houses, and consequently not regular attendants at the semiannual meetings. The



fact that the coming together was not merely for general conference and fraternization, but for the consideration of at least one subject of commanding importance, gave to the conventions unique significance and interest. Both associations also took hold in a very businesslike way of questions connected with the interests of their members, so that it is safe to say that more was accomplished than is usual at gatherings of similar character. Each association, indeed, gave careful consideration to various matters connected with the department of trade represented by them, and adopted measures which promise to have wide and permanent influence on trade relations and methods. To this success Atlanta by its attractiveness, its progressive spirit and its cordial hospitality contributed largely, making the stay of the visitors enjoyable, and causing them to carry away very pleasant recollections of a memorable gathering.

The Welcome Given to Distinguished Guests.

It was at a joint meeting of the associations that the representatives of the independent jobbers and special guests of the conventions made their appearance. E. C. Simmons and A. W. Douglas of the Simmons Hardware Company, W. R. Belknap of the Belknap Hardware & Mfg. Company and S. Norvell and W. L. Yantis of the Norvell-Shapleigh Hardware Company entered the convention hall and were greeted with long continued applause, and invited to seats upon the platform by Mr. Birge, the presiding officer. Early in the session George H. Sargent entered the room, and on motion of H. B. Lupton, seconded by F. R. Plumb, he was invited to the platform. The reception given to Mr. Sargent indicated the honor and affection in which he is held by the trade.

The Catalogue House Question.

The competition of catalogue houses and the way in which it should be met was the dominant topic of the convention. This was the natural result of the invitation to discuss the subject which was extended by W. M. Crumley, president of the Southern Hardware Jobbers' Association, to S. Norvell, and also of the invitation extended by the American Hardware Manufacturers' Association to E. C. Simmons and W. R. Belknap that they address the manufacturers, the subject of their address being left to their decision. As both Mr. Simmons and

Mr. Belknap discussed the catalogue house problem it was given a prominence which it would not otherwise have possessed. The retail interests, it is needless to say, were admirably represented by W. P. Bogardus, president of the National Retail Hardware Dealers' Association; M. L. Corey, secretary of such association, and E. M. Bush, president of the Indiana Retail Hardware Dealers' Association and actively identified with the national body.

Formal Addresses on the Catalogue House Problem.

Very great interest attached to the discussion on the catalogue house question by the gentlemen whose papers on the subject were presented to our readers last week. Particular significance attached to the utterances of these gentlemen from the position which they occupy in the trade as well as from their personality. E. C. Simmons is by general consent the leading Hardware merchant in this country, or, indeed, in the world, and by his ability and character has a commanding place in the trade. His address was a masterly presentation of the subject and impressed all who heard it, and the tens of thousands who have since perused it in print, as a logical, clear cut, reasonable and in all respects satisfactory discussion of a complicated and difficult subject. W. R. Belknap, who followed, did not go into the question with the same detail or elaboration of argument and illustration, but reached the same conclusion and supplemented Mr. Simmons' address most admirably in his felicitous and striking diction. As the head of one of the three or four greatest Hardware jobbing houses, those who listened to his graceful and forcible periods noted with satisfaction the emphatic position taken on the subject under consideration. The views of Mr. Norvell were familiar to all, as they had been stated unequivocally in his communication published in *The Iron Age* April 7, but none the less his able and outspoken address was listened to with special interest. His striking personality, and the fact that he has lately identified himself with the National



Hardware Association and has been made chairman of the committee of this body which will take special charge of the movement against the abuses of the catalogue house business, gave special weight to his words. The formal discussion of the subject was concluded in the able paper of W. P. Bogardus, president of the National Retail Hardware Dealers' Association. While its title was "The Necessity of a Closer Affiliation of Jobbers and Retailers," it was devoted almost exclusively to the subject under consideration. Mr. Bogardus' words were of special significance not only from the force of his argument, but from the fact that he is the official representative of about 5000 retail Hardware merchants connected with the National Association. His personality, too, as a successful and conservative merchant and a writer of directness and force, whose utterances are characterized by clearness and an almost judicial balance, made his paper to be an admirable summing up of the whole subject. The matter under discussion had, indeed, by these various speakers been so thoroughly presented that it was not deemed necessary to continue the discussion.

The Action of the Jobbers.

At an executive session of the Jobbers' Association the subject was considered in its various bearings, and the following resolution adopted:

Whereas, We have heard with pleasure and profit the splendid addresses of S. Norvell and others relative to the subject of catalogue houses and the evils arising therefrom; and,

Whereas, This matter has not attained the proportions in our Southern territory that it has in some others, yet, appreciating that matters of such far reaching influence which affect one portion of the trade should appeal to the craft as a whole, and, in addition thereto, that these matters may sooner than we think be upon us for vigorous action, and in order that we may carry out the idea and spirit of co-operation and federation which render our efforts more effective in obtaining our wishes from those we desire to impress; now, therefore,

Be it resolved, That we appoint R. M. Dudley of Nashville, Tenn., as the representative from this association to act in concert with the representatives of other organizations hereafter to be appointed, and that he be instructed to act in behalf of this association in conjunction with the others in the contemplated meeting.

Mr. Dudley will be recognized as especially qualified to act with the other committees, and may be relied upon to do at least his full share in deciding upon conservative and practicable measures in combating the evils under consideration.

Special Brands.

Among the manufacturers, both in the lobbies and in the convention hall, the subject of special brands received a good deal of attention. The extent to which jobbers are calling for goods made with their own special brands, instead of those of the manufacturers, is recognized as a great and growing evil. With a view to protecting themselves against this, and as the result of careful inquiry into the matter in all its bearings, it was made a special topic for the next meeting of the association. It is felt by the manufacturers that if something practical can be accomplished for the diminution of the abuses which now prevail in this matter it will be a great step in advance.

Courtesies Between Manufacturers and Jobbers.

Very considerate action was taken by the Southern jobbers in appointing a committee to confer with the manufacturers in regard to the time and place of their next meeting. Heretofore both the National Hardware Association and the Southern Hardware Jobbers' Association have determined upon the time and place of their meetings without conference with the American Hardware Manufacturers' Association, who made their meetings contemporaneous. A committee of the Southern Hardware Jobbers' Association to confer with the Manufacturers' Association was appointed, consisting of the following gentlemen, representing, it will be seen, the various sections of the South: John Donnan of Richmond, Va.; F. B. Dunlop of Fort Smith, Ark., and F. A. Heitmann of Houston, Texas. This committee subsequently met with the following committee of the Manufacturers' Association: C. W. Asbury, F. R. Plumb and H. B. Lupton. Of this joint committee F. R. Plumb was chosen chairman, and the matter of determining the time and place of the next meeting of the Southern Association is in their hands. The selection of a locality which will suit both associations in their diverse membership and interests can thus be conveniently and wisely made. The courtesy shown by the Southern jobbers in taking this considerate action was referred to in an appreciative manner by many of the manufacturers.

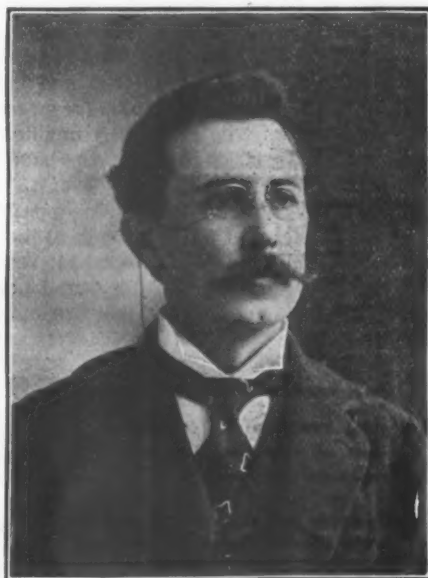
Manufacturers and Independent Jobbers.

It is a significant fact that the largest jobbing houses in the country are not identified with any association, preferring to remain independent. This applies to the following great houses: Simmons Hardware Company, Hibbard, Spencer, Bartlett & Co., Belknap Hardware & Mfg. Company, W. Bingham Company, Janney, Semple, Hill & Co., Fletcher Hardware Company and Wells & Nellegar Company. In the above list would appear the name of the Norvell-Shapleigh Hardware Company only that within a few weeks this house has become a member of the National Hardware Association. The presence of representatives of two of these independent jobbing

houses at the conventions at Atlanta on invitation of the Manufacturers' Association contributed as much perhaps as anything to give distinction to the gathering. Recognizing the importance of having close relations with these houses as well as with those connected with one or the other of the jobbers' associations, the manufacturers extended to the independent jobbers an invitation to attend their next convention. There is, we understand, little doubt that this invitation will be accepted. The fact that it was extended is significant and full of promise. It will certainly meet the approval of all who desire to see harmonious trade relations and united action in regard to common interests.

Next Meeting of the American Hardware Manufacturers' Association.

Some attention was given to the consideration of the question as to where the next meeting of the Manufacturers' Association should be held, but no definite decision was reached. It was thought advisable to refer the matter to the following special committee: H. B. Lupton, F. R. Plumb and C. W. Asbury. While the general impression is that the meeting will be called for Atlantic City



C. B. CARTER, Secretary-Treasurer Southern Hardware Jobbers' Association.

simultaneously with that of the National Hardware Association, this has not been determined, and the question as to the hotel in which the association will have its headquarters is entirely open. The work of the association is assuming so much importance that it is recognized that there would be certain advantages in sometimes holding conventions under circumstances which would permit the association to give undivided attention to its own interests.

Channels of Distribution.

Many of the speakers, especially among the jobbers, took occasion to refer to the theory that the regular, and, indeed, the only legitimate channel for the distribution of goods is through the jobbers to the retailers. In maintenance of this theory, to which the trade are aware there are many exceptions, the following resolution was adopted by the Jobbers' Association:

Whereas, Our attention has been called by the National Hardware Association of the United States to the fact that some manufacturers of Hardware are distributing their products through wholesale grocery houses, as well as through the medium of the wholesale Hardware houses;

Resolved, That we recommend to the very favorable consideration of the members of the American Hardware Manufacturers' Association the request of the National Hardware Association of the United States that in the sale of Hardware at jobbers' prices the wholesale Hardware trade of the country be recognized as the only proper medium through which goods should be distributed to the retail trade.

The National Retail Hardware Dealers' Association.

The presence of representatives of retail merchants on invitation of the jobbers and manufacturers was a feature of the gathering. The National Association of Retailers was represented by W. P. Bogardus, its president; M. L. Corey, its secretary, and E. M. Bush, one of its active members and president of the Indiana Association. They were given a most cordial reception, and in discussion of the catalogue house question and other topics in which retail merchants are concerned the information they were able to give and their suggestions based upon experience in combating the disturbing influences were of much service. In view of the favor with which their presence was regarded it is safe to assume that representatives of the National Retail Hardware Dealers' Association will be welcomed to all future gatherings in which jobbers and manufacturers unite. In this way a representation of the entire trade is secured.

The Band Wagon Cartoon.

The cartoon published in *The Iron Age* May 19 was frequently referred to in conversation and in more formal discussion. It was regarded as an amusing but accurate portrayal of the manner in which the catalogue house question has suddenly come into prominence through discussions in *The Iron Age*, which have had the effect of drawing out expressions from jobbers and manufacturers who have heretofore been indifferent or non-committal in the matter. The practically unanimous desire on the part of the jobbers to get on the band wagon contrasts with the more reserved attitude of the manufacturers, who, however, are seen to be in sympathy with the movement. The fact that the cartoon gave the prominent place to the representatives of retail interests, who have for years been agitating the subject and preparing for the awakening of interest which has suddenly come, was referred to as giving credit where it belongs, as they were the prime movers in the campaign.

Guarantees Against Declines.

An interesting and significant discussion took place at the joint session of the manufacturers and jobbers on Thursday in reply to the following query:

If it is reasonable for the manufacturers to guarantee the jobbers' stock on hand against decline in price, why should the manufacturer not receive advantage for increase in price of stock on hand when advances are made?

There was an informal debate on this question, in which J. B. Moore of Birmingham and Charles H. Ireland of Greensboro participated, and in the course of it ex-Governor Goodell of New Hampshire spoke as follows:

EX-GOVERNOR GOODELL'S REMARKS.

We are told that the manufacturers sometimes take advantage of the merchants in the fact that they reduce the prices suddenly, which leaves them with a large stock of goods on hand. This sometimes does happen. When the manufacturer sees there is going to be a reduction in prices he naturally takes pains to dispose of all the goods he possibly can, in order that they may be ready for the crash when it comes. This ought not to be countenanced. No man has a right to take advantage of his friends by disposing of goods to the jobber at a higher price than they are worth. Now, if a lot of goods are worth to-day \$1.50 or \$2, and if next week they are not worth \$1, and if I sell the goods that are not worth \$1 for \$1.50 or \$2, I am taking advantage of you. On the other hand, the manufacturers are obliged to associate themselves together for the purpose of raising the prices to a point where they can get a living out of it, and there are sometimes cases when it seems to be the only way that this can be done. Now, I want to ask if they ever knew, under any circumstances, any association having been made, that the jobbers did not prefer it was organized and didn't send in large numbers of orders? If that is true, the jobber has the advantage of the first year, perhaps, of the association. I know it seems to be so that in certain cases for a whole year the jobber is provided with goods at the old ruinous prices in order that he may secure himself. The jobber finds it out somehow or other. Now, what are they going to do? They are keen and sharp in discovering those things and are not likely to have a large stock of goods on hand when the prices are reduced.

I want to put this conundrum to the jobbers of this

country: Will you, the jobbers of the Southern Association, or of the National, agree, provided the manufacturers will agree to your proposition, that they will refund to you such an amount as you have on hand in stock—will you agree when the manufacturers' association is organized to go to work and look over your stock and advance those prices and send check to your manufacturer? Will you agree to give the manufacturers the advantage of the advantages that you have obtained if the manufacturer will agree to reciprocate? This should be done and you should receive a check from the manufacturers for all the loss that you suffered on account of the reduction of prices, provided you will look over your stock and send him in a check for the balance we ought to receive to realize by virtue of decline in the cost price of the goods.

Resolutions in Regard to Legislation.

The following resolutions relating to bills before Congress were adopted by the Southern Association:

Whereas, There is now pending before the Congress of the United States a bill entitled "A bill to limit the meaning of the word 'conspiracy' and the use of 'restraining orders and injunctions' in certain cases," known as Bill H. R. 89; and

Whereas, We believe, after a very careful consideration of the text of the bill, that incalculable injury will be done to all employers of labor and through them to



F. D. MITCHELL, Secretary-Treasurer, American Hardware Manufacturers' Association.

the welfare of the country if the bill shall become a law; therefore be it

Resolved, That we do most earnestly urge upon all members of Congress as a plain patriotic duty, especially in the present sensitive condition of commerce and industry, to use all proper means in their power to accomplish the defeat of the said bill. And be it further

Resolved, That the officers and Executive Committee be and are hereby instructed to use the influence of this association against the said bill.

Whereas, There is now pending before the Congress of the United States a bill having for its object limiting the duration of a day's work by all labor employed on Government contracts, the said bill having been referred to the Secretary of Commerce and Labor for a report upon its effects; and

Whereas, We believe the enactment of the said bill into law will prove disastrous, directly or indirectly, to all employers of labor; be it therefore

Resolved, That the officers and Executive Committee be and are hereby requested to convey to the Secretary of Commerce and Labor the views of this association, and that they also be requested to co-operate with other associations interested in the defeat of the said bill.

Hospitality.

Atlanta indicated in many ways its well-known spirit of hospitality. The delegates on arrival were met with courteous attention, and the various committees did their part well in furthering the comfort and plans of their guests. The entertainment on Tuesday evening at the Grand Opera House, the smoker on Wednesday evening, the banquet on Thursday evening and the barbecue

on Friday were the formal entertainments extended. Besides them, however, the privileges of the clubs of the city were given and many other courtesies shown, to say nothing of the individual attentions from the residents of the city. The visitors certainly carried away the pleasantest impressions of the city and its people.

The Banquet.

An elaborate banquet tendered by the manufacturers was enjoyed on Thursday evening by a brilliant company assembled in the banquet hall of the Kimball House, many ladies being among the guests. After the dinner Henry B. Lupton of Pittsburgh introduced Irby Bennett, who made a graceful speech on assuming the position of toastmaster, a place which he filled very happily. His address of welcome was responded to by W. M. Crumley, president of the Southern Hardware Jobbers' Association, and in a more extended address by J. C. Birge, president of the American Hardware Manufacturers' Association, which was among the best of the evening, and a careful and eloquent discussion of important questions. The speakers who followed and their subjects were as follows: OUR COUNTRY, James R. Gray, Atlanta; THE SOUTH, John Temple Graves, Atlanta; GEORGIA, Governor Joseph M. Terrell, Atlanta; ATLANTA, Clark Howell, Jr., Atlanta; AU REVOM, T. James Fernley, Philadelphia. The speeches were of unusual merit, and were listened to with appreciation by the distinguished audience. At one time during the speaking there was, owing perhaps to an excess of good fellowship, a lack of attention on the part of a few and a murmur of conversation which was disturbing to those desiring to catch every word of the eloquent speakers. Mr. Bennett, toastmaster, was, however, equal to the occasion, and as guardian of the rights of the guests and in a direct and forcible manner, with words ringing with authority and determination, rebuked the disturbers and demanded quiet and attention. His action met with the decided approval of the company, as was evident from the hearty applause which followed. The guests were not further annoyed by any disturbance, and the proceedings were continued with unabated interest to the close. The Dinner Committee and those in charge of the programme received many compliments on the great success of the evening.

Officers of the Southern Hardware Jobbers' Association.

The re-election of all the officers of the Southern Hardware Jobbers' Association was a recognition of the ability and acceptability with which they had filled their respective offices. The officials for the current year are accordingly as follows:

PRESIDENT, W. M. Crumley, Atlanta, Ga.

FIRST VICE-PRESIDENT, John Donnan, Richmond, Va.

SECOND VICE-PRESIDENT, E. A. Peden, Houston, Texas.

C. B. Carter, Knoxville, Tenn., was reappointed secretary-treasurer.

Mr. Crumley especially was the recipient of many congratulations on the success of the convention, to preparations for which he had given much thought and labor, and whose sessions he conducted with so much skill and tact.

Souvenirs.

Many souvenirs were distributed at Atlanta, among them the following:

IVER JOHNSON'S ARMS & CYCLE WORKS, Fitchburg, Mass.: Morocco pocket book.

INTERNATIONAL CUTLERY COMPANY, Fremont, Ohio: Razor and Scissors.

HERMANN BOKER & Co., New York: Razor.

RUSSELL & ERWIN MFG. COMPANY, New York: Artistic card receiver.

READING HARDWARE COMPANY, Reading, Pa.: Plaques, badges, buttons, lizards, &c.

E. C. ATKINS & Co., Indianapolis, Ind.: Check canceller.

ROMER AXE COMPANY, Dunkirk, N. Y.: Axe Pattern Hatchets.

COLUMBIAN HARDWARE COMPANY, Cleveland, Ohio: Ink well.

BLACKLOCK FOUNDRY, South Pittsburg, Tenn.: Miniature Sad Irons.

NORTH BROTHERS MFG. COMPANY, Philadelphia: Badge in *fac-simile* of Liberty Bell.

MICHIGAN STOVE COMPANY, Detroit, Mich.: Pocket-book.

G & H. BARNETT COMPANY, Philadelphia: Manicure File.

MAYER & Co., Philadelphia: Manicure File.

IRWIN AUGER BIT COMPANY, Wilmington, Ohio: Miniature Auger.

STANDARD TOOL COMPANY, Cleveland, Ohio: Penholder.

WM. SCHOLLEHORN COMPANY, New Haven, Conn.: Combination Pliers.

WINCHESTER REPEATING ARMS COMPANY, New Haven, Conn.: Stick Pins.

UNION METALLIC CARTRIDGE COMPANY, Bridgeport, Conn.: Badges and Stick Pins.

PETERS CARTRIDGE COMPANY, Cincinnati, Ohio: Artistic Letter Opener and Button Badge.

WM. VOGEL & BROS., Brooklyn, N. Y.: Brass Oil Cans.

NICHOLSON FILE COMPANY, Providence, R. I.: Manicure File and candy for ladies.

TROY NICKEL WORKS, Albany, N. Y.: Pocket mirror.

SIMONDS MFG. COMPANY, Fitchburg, Mass.: Chain for Keys.

MCCAFFREY FILE COMPANY, Philadelphia: Manicure File.

STANLEY WORKS, New Britain, Conn.: Artistic Watch Fob.

AMERICAN SCREW COMPANY, Providence, R. I.: Flowers given to ladies at banquet.

YALE & TOWNE MFG. COMPANY, Stamford, Conn.: Bronze Ash Holder.

HENRY DISSTON & SONS., Philadelphia: Pocket Knife.

E. I. DUPONT COMPANY, Wilmington, Del.: Cuff Button representing a keg of powder.

ACME WHITE LEAD & COLOR WORKS, Detroit, Mich.: Cigar Cutter.

THE ATTENDANCE.

There was a larger attendance of the Southern jobbers than at any recent meeting, although the absence of some of the members whose presence would have added to the pleasure and usefulness of the gathering was regretted. The manufacturers, too, were out in good force, but on account of distance their association was not as largely represented, so far as numbers are concerned, as at some former assemblies. The attendance also of many ladies added much to the pleasure of the gathering. The following list of the representatives of the jobbers and manufacturers and their guests is taken from the "Index Attendance" and the official register:

J. C. Sproull, Anniston, Ala., Anniston Hardware Company.

W. F. Stephenson, Birmingham, Ala., Gray & Dudley Hardware Company.

J. D. Moore, Birmingham, Ala., Moore & Handley Hardware Company.

W. C. Paden, Gadsden, Ala., Paden-Ewing Hardware Company.

T. G. Ewing, Gadsden, Ala., Paden-Ewing Hardware Company.

Geo. R. Vaughan, Mobile, Ala., Barney-Cavanaugh Hardware Company.

H. M. Price, Mobile, Ala., H. M. Price & Co.

W. T. Kelley, Mobile, Ala., H. M. Price & Co.

G. W. Barnett, Montgomery, Ala., G. W. Barnett Hardware Company.

W. M. Teague, Jr., Montgomery, Ala., Teague & Sons.

W. A. Ray, Montgomery, Ala., Teague & Sons.

L. G. Ray, Montgomery, Ala., Teague & Sons.

J. W. Spinks, Montgomery, Ala., Teague & Sons.

H. L. Solomon, Montgomery, Ala., Teague & Sons.

Ben. J. Schuster, Selma, Ala., Ben. J. Schuster.

Robert Jemison, Tuscaloosa, Ala., Allen & Jemison Company.

M. P. Jemison, Tuscaloosa, Ala., Allen & Jemison Company.

F. B. Dunlop, Ft. Smith, Ark., Speer Hardware Company.

W. W. Webber, Ft. Smith, Ark., Webber-Ayers Hardware Company.

G. H. Lyon, Little Rock, Ark., W. W. Dickinson Hardware Company.

J. J. Mandlebaum, Little Rock, Ark., Fones Bros. Hardware Company.

J. Van Dokkum, Little Rock, Ark., Fones Bros. Hardware Company.

Lee Fox, Pine Bluff, Ark., Fox Bros. Hardware Company.

Frank S. Gray, Jacksonville, Fla., S. B. Hubbard Company.

J. B. Yerkes, Jacksonville, Fla., Florida Hardware Company.

P. G. Wall, Tampa, Fla., Knight & Wall Company.

I. S. Craft, Tampa, Fla., Knight & Wall Company.

W. C. Thomas, Tampa, Fla., Tampa Hardware Company.

W. B. Jackson, Athens, Ga., Athens Hardware Company.

- Wm. Peek, Athens, Ga., T. Fleming & Sons.
H. L. Anderson, Atlanta, Ga., Anderson Hardware Company.
G. R. Stafford, Atlanta, Ga., E. C. Atkins & Co.
F. X. Ohlen, Atlanta, Ga., F. C. Atkins & Co.
W. M. Crumley, Atlanta, Ga., Beck & Gregg Hardware Company.
W. A. Parker, Atlanta, Ga., Beck & Gregg Hardware Company.
L. H. Beck, Atlanta, Ga., Beck & Gregg Hardware Company.
R. M. Crumley, Atlanta, Ga., Beck & Gregg Hardware Company.
S. C. Dinkins, Atlanta, Ga., Dinkins & Davidson.
E. A. Davidson, Atlanta, Ga., Dinkins & Davidson.
H. L. Davidson, Atlanta, Ga., Dinkins & Davidson.
Mark Palmour, Atlanta, Ga., Dinkins & Davidson.
Geo. E. King, Atlanta, Ga., King Hardware Company.
Wm. E. Newill, Atlanta, Ga., King Hardware Company.
Dr. J. N. LeConte, Atlanta, Ga., King Hardware Company.
Maurice-Walton Hardware Company, Augusta, Ga.
W. J. Griffin, Rome, Ga., Griffin Hardware Company.
B. T. Haynes, Rome, Ga., Rome Hardware Company.
A. B. Palmer, Savannah, Ga., Palmer Hardware Company.
S. E. Clarkston, Oklahoma City, O. T., Armstrong Hardware Company.
B. F. Eshleman, New Orleans, La., Stauffer, Eshleman & Co.
E. H. Vordenbaumen, Shreveport, La., Vordenbaumen-Eastham Company, Limited.
Lee Richardson, Vicksburg, Miss., Lee Richardson & Co.
C. G. Wright, Vicksburg, Miss., Wright Bros.
J. H. Weddington, Charlotte, N. C., Weddington Hardware Company.
W. M. Thompson, Charlotte, N. C., Weddington Hardware Company.
J. A. Odell, Greensboro, N. C., Odell Hardware Company.
Chas. H. Ireland, Greensboro, N. C., Odell Hardware Company.
J. R. Tobias, Charleston, S. C., Marshall, Westcoat & Co.
J. D. Mitchell, Bristol, Tenn., Mitchell-Powers Hardware Company.
W. L. Magill, Chattanooga, Tenn., Magill Hardware Company.
J. C. Luttrell, Knoxville, Tenn., S. B. Luttrell & Co.
Bruce Keener, Knoxville, Tenn., C. M. McClung & Co.
Wallace Woodruff, Knoxville, Tenn., Woodruff Hardware Company.
B. M. Gladding, Memphis, Tenn., E. C. Atkins & Co.
R. D. Warren, Memphis, Tenn., Benedict, Warren & Davidson.
Fred. Orgill, Memphis, Tenn., Orgill Bros. & Co.
J. C. Bering, Houston, Texas, Bering-Cortes Hardware Company.
F. A. Heitmann, Houston, Texas, F. W. Heitmann Company.
Spencer James, Danville, Va., Piedmont Hardware Company.
O. B. Barker, Lynchburg, Va., Barker-Jennings Hardware Company.
Frank M. Hobbs, Petersburg, Va., Charles Leonard.
S. H. Wilkinson, Richmond, Va., Richmond Hardware Company.
John Donnan, Richmond, Va., W. S. Donnan Hardware Company.
C. H. Watkins, Richmond, Va., Watkins-Cottrell Company.
C. B. Carter, Knoxville, Tenn., secretary-treasurer Southern Hardware Jobbers' Association.
T. James Fernley, Philadelphia, Pa., secretary-treasurer National Hardware Association.
S. Norvell, St. Louis, Mo., Norvell-Shapleigh Hardware Company.
W. L. Yantis, St. Louis, Norvell-Shapleigh Hardware Company.
E. C. Simmons, St. Louis, Mo., Simmons Hardware Company.
W. R. Belknap, Louisville, Ky., Belknap Hardware Company.
E. S. Crane, Yazoo City, Miss., Crane-Hinman Hardware Company.
W. P. Bogardus, Mt. Vernon, Ohio, president National Retail Hardware Dealers' Association.
M. L. Corey, Argos, Ind., secretary National Retail Hardware Dealers' Association.
Henry L. Geissel, New York, *Hardware*.
A. Eugene Bolles, New York, *Hardware*.
Archibald P. Mitchell, New York, *Hardware*.
Harry Wise, Chattanooga, Tenn., the *Tradesman*.
Harry Wise, Jr., Chattanooga, Tenn., the *Tradesman*.
Daniel Stern, Chicago, Ill., the *American Artisan*.
Max I. Barth, Chattanooga, Tenn., the *Tradesman*.
R. R. Williams, New York, *The Iron Age*.
D. J. Weisiger, Richmond, Va.
F. H. Woodworth, Chattanooga, Tenn., F. H. Woodworth & Co.
John G. Christopher, Jacksonville, Fla., Southern Supply & Machinery Dealers' Association.
J. C. Miller, Huntington, W. Va., Southern Supply & Machinery Dealers' Association.
Harry D. Harvey, Baltimore, Md., National Supply Company.
Robert E. Wier, Baltimore, Md., Wier Bros.
John K. Wilson, Baltimore, Md., Wier & Wilson.
R. D. Carver, Birmingham, Ala., Alabama Steel & Wire Company.
F. S. Kretsinger, Cleveland, Ohio, American Fork & Hoe Company.
T. A. Carter, Cleveland, Ohio, American Fork & Hoe Company.
Hor. D. H. Goodell, Antrim, N. H., Goodell Company.
Richard Goodell, Antrim, N. H., Goodell Company.
Arthur W. Bond, Baltimore, Md., Goodell Company.
Irby Bennett, Memphis, Tenn., Winchester Repeating Arms Company.
Geo. H. Hillman, New Haven, Conn., Winchester Repeating Arms Company.
Frank G. Drew, Lansdown, Pa., Winchester Repeating Arms Company.
J. Hildreth, New Haven, Conn., Winchester Repeating Arms Company.
Samuel Disston, Philadelphia, Pa., Henry Disston & Sons.
Harry C. Disston, Philadelphia, Pa., Henry Disston & Sons.
Chas. P. King, Atlanta, Ga., American Iron & Steel Mfg. Company.
Wm. E. Jones, Columbus, Ohio, Ohio Tool Company.
S. H. Jacobs, Albany, N. Y., Troy Nickel Works.
John E. Gaitley, Albany, N. Y., Troy Nickel Works.
T. H. Taylor, New York, American Steel & Wire Company.
D. A. Merriman, Chicago, Ill., American Steel & Wire Company.
J. J. Gilmore, Chicago, Ill., American Steel & Wire Company.
H. J. McCue, Chicago, Ill., American Steel & Wire Company.
Chas. F. Smith, New Britain, Conn., Landers, Frary & Clark.
Geo. M. Landers, New Britain, Conn., Landers, Frary & Clark.
Fred. M. Huggins, New Britain, Conn., Landers, Frary & Clark.
W. S. Purnell, Philadelphia, Pa., Merchant & Co.
McKenzie P. Dehon, Philadelphia, Pa., Merchant & Co.
Geo. W. Corbin, New Britain, Conn., Corbin Cabinet Lock Company.
Geo. L. Corbin, New Britain, Conn., Corbin Cabinet Lock Company.
C. H. Baldwin, New Britain, Conn., Corbin Cabinet Lock Company.
J. H. Hardwick, Cleveland, Tenn., Hardwick Stove Company.
C. L. Hardwick, Cleveland, Tenn., Hardwick Stove Company.
John W. Nichols, Augusta, Ga., American Can Company.
A. J. Marcuse, New York, American Can Company.
Chas. Stollberg, Toledo, Ohio, American Can Company.
B. C. Summers, Columbia, S. C., American Can Company.
W. H. O'Rear, Atlanta, Ga., American Can Company.
E. R. Phillip, Atlanta, Ga., American Can Company.
W. F. Comer, Birmingham, Ala., American Can Company.
T. H. Keller, New York, Peters Cartridge Company.
J. S. French, Cincinnati, Ohio, Peters Cartridge Company.
H. B. Lemcke, New York, Peters Cartridge Company.
E. H. Storr, New York, Peters Cartridge Company.
W. E. Keplinger, Cincinnati, Ohio, Peters Cartridge Company.
F. C. Tuttle, Cincinnati, Ohio, Peters Cartridge Company.
J. W. Hightower, Cincinnati, Ohio, Peters Cartridge Company.
Wm. H. Cole, New York, Tower & Lyon Company.
T. D. Halliwell, New York, Tower & Lyon Company.
T. J. Stephenson, Knoxville, Tenn., Knoxville Iron Company.
E. D. Morton, Knoxville, Tenn., Knoxville Iron Company.
W. P. Davis, Knoxville, Tenn., Knoxville Iron Company.
W. A. Corry, New York, J. C. McCarty & Co.
Clement M. Biddle, New York, Biddle Purchasing Company.
John P. Cole, Pittsburgh, Pa., Biddle Purchasing Company.
Gifford K. Simonds, Fitchburg, Mass., Simonds Mfg. Company.
P. L. Laughlin, Fitchburg, Mass., Simonds Mfg. Company.
J. E. Kelley, Fitchburg, Mass., Simonds Mfg. Company.
N. A. Gladding, Indianapolis, Ind., E. C. Atkins & Co.
F. Herbert Smith, Indianapolis, Ind., E. C. Atkins & Co.
E. W. Clark, Indianapolis, Ind., E. C. Atkins & Co.
G. W. Brown, Columbus, Ga., Southern Plow Company.
A. J. Teague, Columbus, Ga., Southern Plow Company.
W. M. Cosgrave, Columbus, Ga., Southern Plow Company.
M. A. Cook, Columbus, Ga., Southern Plow Company.
Capt. Geo. B. Whitesides, Columbus, Ga., Southern Plow Company.
S. B. Bispham, New York, Russell & Erwin Mfg. Company.
A. R. Sisson, New York, Russell & Erwin Mfg. Company.
B. A. Hawley, New Britain, Conn., Russell & Erwin Mfg. Company.
J. A. Popeano, New York, Max Klaas.
Joseph J. McCaffrey, Philadelphia, Pa., McCaffrey File Company.
F. M. Snook, Cincinnati, Ohio, Dana & Co.
E. G. Buckwell, Cleveland, Ohio, Cleveland Twist Drill Company.
Frank Overbacker, Louisville, Ky., O. K. Stove & Range Company.
Owen J. Geraghty, Philadelphia, Pa., N. & G. Taylor Company.
Geo. A. Baird, Chicago, Ill., Republic Iron & Steel Company.
C. M. King, Allegheny, Pa., McKinney Mfg. Company.
Thos. E. Oliver, New York, Oliver Bros.
C. W. Asbury, Philadelphia, Pa., Enterprise Mfg. Company.
N. E. Marshall, Sandusky, Ohio, Sandusky Tool Company.
Lewis R. Hardy, Louisville, Ky., Brinly-Hardy Company.
C. M. Fouche, Chattanooga, Tenn., Crucible Steel Company of America.
W. A. Chenoweth, Birmingham, Ala.
Arthur S. Jones, Memphis, Tenn., Jones & Thompson.
C. F. Carrier, Elmira, N. Y., Cronk & Carrier Mfg. Company.
A. M. Whaley, Trenton, N. J., New Jersey Wire Cloth Company.
Wm. K. Stone, Atlanta, Ga., F. I. Stone & Co.
Newton Kelsay, Evansville, Ind., Newton Kelsay.
Roy Kelsay, Evansville, Ind., Newton Kelsay.
T. M. Riley, Baltimore, Md., Wm. H. Cole & Sons.
J. H. McAllister, Chattanooga, Tenn.
H. F. Reese, Baltimore, Md., Fairbanks Company.
L. D. Vogel, St. Louis, Mo., Charter Oak Stove & Range Company.
J. T. Rader, Fremont, Ohio, International Cutlery Company.
L. C. Frazer, Birmingham, Ala.
Fayette R. Plumb, Philadelphia, Pa., Fayette R. Plumb, Incorporated.
F. C. Maurer, Baltimore, Md., Spang, Chalfant & Co.
H. H. Beers, Richmond, Va., Beers & Mitchell.
Guy Mitchell, Atlanta, Ga., Beers & Mitchell.
A. R. Sullivan, Rome, Ga., Towers & Sullivan Mfg. Company.
H. A. Dean, Rome, Ga., Towers & Sullivan Mfg. Company.
Geo. F. Wileper, New York, Sargent & Co.
Frank Guldener, New York, Sargent & Co.
Wallace L. Pond, Providence, R. I., Nicholson File Company.

- John R. Scott, New Orleans, La., American Sheet & Tin Plate Company.
- Edward Ingalls, Newark, N. J., Atha Tool Company.
- Harry G. Atha, Newark, N. J., Atha Tool Company.
- W. B. Lashar, Bridgeport, Conn., Bridgeport Chain Company.
- Walter H. Brooke, Cleveland, Ohio, Bronson-Walton Company.
- Geo. E. Holton, Catasauqua, Pa., Bryden Horse Shoe Company.
- John R. Scott, Pittsburgh, Pa., Carnegie Steel Company.
- E. D. Starke, Richmond, Va., Starke's Dixie Plow Works.
- R. T. Lane, Cleveland, Ohio, Standard Tool Company.
- Howard Schurmann, Indianapolis, Ind., Barry Saw Company.
- T. H. Gossett, New York, Peck, Stow & Wilcox Company.
- G. M. Robeson, Farmville, Va., Farmville Mfg. Company.
- F. E. Muzzy, Chicopee Falls, Mass., J. Stevens Arms & Tool Company.
- C. E. Roberts, Chicopee Falls, Mass., J. Stevens Arms & Tool Company.
- W. M. Taussig, Bridgeport, Conn., Challenge Cutlery Corporation.
- H. M. Chapin, Pine Meadow, Conn., Chapin-Stephens Company.
- F. M. Chapin, Pine Meadow, Conn., Chapin-Stephens Company.
- F. L. Stephens, Pine Meadow, Conn., Chapin-Stephens Company.
- Charles Glover, New Britain, Conn., Corbin Screw Corporation.
- A. W. Bowman, New Britain, Conn., Corbin Screw Corporation.
- C. A. Earl, New Britain, Conn., Corbin Screw Corporation.
- C. H. Bennett, Plymouth, Mich., Dalsey Mfg. Company.
- E. C. Hough, Plymouth, Mich., Dalsey Mfg. Company.
- W. W. Reding, Evansville, Ind., Evansville Tool Works.
- C. Dinkerson, Evansville, Ind., Evansville Tool Works.
- Wm. M. Pratt, Greenfield, Mass., Goodell-Pratt Company.
- John H. Faxon, Elyria, Ohio, Grafton Stone Company.
- F. S. Miller, Elyria, Ohio, Grafton Stone Company.
- R. S. Wetmore, Wilmington, Del., Hazard Powder Company.
- John Z. O'Donnell, Wilmington, Del., Hazard Powder Company.
- Tazewell Baumgardner, Wilmington, Del., Hazard Powder Company.
- A. R. Griffin, Wilmington, Del., Hazard Powder Company.
- E. E. Perry, Norwich, Conn., Hopkins & Allen Arms Company.
- J. D. Bethel, Norwich, Conn., Hopkins & Allen Arms Company.
- J. L. Sperry, Bridgeport, Conn., Hurwood Mfg. Company.
- F. S. Calvin, Wilmington, Ohio, Irwin Auger Bit Company.
- Fred. I. Johnson, Fitchburg, Mass., Iver Johnson's Arms & Cycle Works.
- Thomas Ellis, Fitchburg, Mass., Iver Johnson's Arms & Cycle Works.
- F. I. Clark, Fitchburg, Mass., Iver Johnson's Arms & Cycle Works.
- James P. Kelly, Alexandria, Ind., Kelly Axe Mfg. Company.
- George T. Price, Alexandria, Ind., Kelly Axe Mfg. Company.
- F. H. Oakman, Shelburne Falls, Mass., Lamson & Goodnow Mfg. Company.
- J. T. Quarles, Shelburne Falls, Mass., Lamson & Goodnow Mfg. Company.
- Selden Jones, St. Louis, Mo., A. Leschen & Sons Rope Company.
- C. F. Forsyth, Meriden, Conn., Meriden Cutlery Company.
- Harry Mayer, Philadelphia, Pa., Mayer & Co.
- J. W. Thurber, Shelburne Falls, Mass., H. H. Mayhew Company.
- A. C. Albrecht, Philadelphia, Pa., North Bros. Mfg. Company.
- Henry B. Lupton, Pittsburgh, Pa., Oliver Iron & Steel Company.
- F. H. Forman, Pittsburgh, Pa., Pittsburgh Steel Company.
- W. C. Reitz, Pittsburgh, Pa., Pittsburgh Steel Company.
- Tom T. Johnson, Pittsburgh, Pa., Pittsburgh Steel Company.
- Wm. Taylor, Pittsburgh, Pa., Pittsburgh Steel Company.
- J. E. Harbster, Reading, Pa., Reading Hardware Company.
- G. N. Jacobi, Reading, Pa., Reading Hardware Company.
- W. H. Bennett, Chicago, Ill., Reading Hardware Company.
- C. S. Packard, Reading, Pa., Reading Hardware Company.
- T. B. Hendrickson, Reading, Pa., Reading Hardware Company.
- J. C. McDonald, Reading, Pa., Reading Hardware Company.
- H. R. Bass, Reading, Pa., Reading Hardware Company.
- B. Luerssen, Reading, Pa., Reading Hardware Company.
- W. H. Clark, Reading, Pa., Reading Hardware Company.
- S. Y. Reyner, Reading, Pa., Reading Hardware Company.
- A. C. Romer, Dunkirk, N. Y., Romer Axe Company.
- F. J. Schollhorn, New Haven, Conn., Wm. Schollhorn Company.
- L. H. Pease, New Britain, Conn., Stanley Works.
- A. E. Duncan, New Britain, Conn., Stanley Works.
- Jas. Hutchinson, New Britain, Conn., Stanley Works.
- Geo. P. Hart, New Britain, Conn., Stanley Works.
- Fred. S. Merrick, New Brighton, Pa., Standard Horse Nail Company.
- Julius C. Birge, St. Louis, Mo., St. Louis Shovel Company.
- Walter W. Birge, St. Louis, Mo., St. Louis Shovel Company.
- Louis H. Vogel, Brooklyn, N. Y., Wm. Vogel & Bros.
- Will I. Sherwood, Brooklyn, N. Y., Wm. Vogel & Bros.
- H. E. Barden, Wallingford, Vt., Wallingford Mfg. Company.
- H. B. Barden, Wallingford, Vt., Wallingford Mfg. Company.
- Lester F. Thurber, Nashua, N. H., White Mountain Freezer Company.
- C. C. Nottingham, East Lake, Tenn., Chattanooga Wheelbarrow Company.
- A. E. Briggs, Bellevue, Ohio, Ohio Cultivator Company.
- J. S. Bonbright, Philadelphia, Pa., Supplee Hardware Company.
- C. E. Bell, Hillsboro, Ohio, C. S. Bell Company.
- S. G. Glillian, Ironton, Ohio, Belfont Iron Works Company.
- F. D. Mitchell, Philadelphia, Pa., secretary-treasurer American Hardware Manufacturers' Association.
- Clyde L. King, Atlanta, Ga., Atlanta Agricultural Works.
- Frank S. Dean, Atlanta, Ga., Atlanta Agricultural Works.
- J. E. Powell, Atlanta, Ga., Atlanta Agricultural Works.
- George D. Kirkham, Memphis, Tenn., American Steel & Wire Company.
- Henry Wetter, Memphis, Tenn., H. Wetter Mfg. Company.
- C. C. Huntington, Memphis, Tenn., H. Wetter Mfg. Company.
- E. J. Bryan, Birmingham, Ala., Austin-Bryan Mfg. Company.
- W. E. Austin, Atlanta, Ga.
- E. H. Sholar, East Chattanooga, Tenn., Chattanooga Implement & Mfg. Company.
- Geo. V. Willson, Pittsburgh, Pa., Hussey-Binns Company.
- J. H. Grubb, Philadelphia, Pa., Hussey-Binns Company.
- H. W. Christian, Buford, Ga., Bona Allen.
- J. L. Shadburn, Buford, Ga., Bona Allen.
- Jno. Allen, Buford, Ga., Bona Allen.
- Frank M. Snook, Cincinnati, Ohio, Lanna & Co.
- Howard Fairbrother, Atlanta, Ga., Jewell Belting Company.
- Alfred Clark, Chicago, Ill., Oneida Community.
- P. B. Noyes, Chicago, Ill., Oneida Community.
- Dr. John A. Rockwell, Harriman, Tenn., Harriman Plow & Handle Company.
- W. A. Rockwell, Harriman, Tenn., Harriman Plow & Handle Company.
- Julian A. Holmes, Turner's Falls, Mass., John Russell Cutlery Company.
- Samuel N. Nicholson, Providence, R. I., Nicholson File Company.
- George F. Baker, Providence, R. I., Nicholson File Company.
- Wallace L. Pond, Providence, R. I., Nicholson File Company.
- J. H. Towne, New York, Yale & Towne Mfg. Company.
- A. W. Clark, New York, Yale & Towne Mfg. Company.
- J. B. Parrent, New York, Yale & Towne Mfg. Company.
- F. R. Blauvelt, New York, R. K. Carter & Co.
- George L. Knight, Nashville, Tenn., Tubular Rivet & Stud Company.
- D. W. Fleming, Anniston, Ala., Anniston Cordage Company.
- J. W. Bogle, Dalton, Ga., Liberty Stove Company.
- D. P. Hale, Sandersville, Ga., John Chatillon & Sons.
- Benj. T. Longstreet, Philadelphia, Pa., Morris, Wheeler & Co.
- A. C. Albrecht, Philadelphia, Pa., North Bros. Mfg. Company.
- R. N. Barber, New York, Smith & Hemenway Company.
- R. P. Boyd, New York, John H. Graham & Co.
- W. W. Crandall, Nashville, Tenn., W. W. Crandall & Co.
- Percy C. Cauthorn, Nashville, Tenn., W. W. Crandall & Co.
- H. P. Chenoweth, New York, Sargent & Co.
- T. W. Gathright, Atlanta, Ga., C. E. Jennings & Co.
- Geo. L. Haven, Atlanta, Ga., P. & F. Corbin.
- J. W. Ryan, New Britain, Conn., P. & F. Corbin.
- G. B. Hobson, Richmond, Va., Tredegar Iron Company.
- John Hoen, Baltimore, Md., Henry Keldel & Co.
- Jos. M. Hottel, Philadelphia, Pa., G. & H. Barnett Company.
- A. C. Langston, Atlanta, Ga., Jenkins Bros.
- O. C. Mead, Louisville, Ky., Mead & Smith.
- Chas. Ingram, Baltimore, Md., National Enameling & Stamping Company.
- V. A. Moore, Atlanta, Ga., American Iron & Steel Mfg. Company.
- James T. Powell, New Britain, Conn., Stanley Rule & Level Company.
- J. T. Quarles, New York, Lamson & Goodnow Mfg. Company.
- H. G. Reinicker, Baltimore, Md., Hermann Boker & Co.
- John S. Sanders, Atlanta, Ga., Union Metallic Cartridge Company.
- W. P. Smith, Rogersville, Tenn., Mead & Smith.
- Daniel K. Stuckl, Buffalo, N. Y., White Mountain Freezer Company.
- L. D. Vogel, St. Louis, Mo., Charter Oak Stove & Range Company.
- Dave Walke, Baltimore, Md., National Enameling & Stamping Company.
- C. K. Woodburn, Chicago, Ill., Warren McArthur.
- Wm. E. Jones, Columbus, Ohio, Ohio Tool Company.
- E. H. Brittan, Columbus, Ohio.
- Mr. Benson, Lancaster, Pa., S. R. Slaymaker.
- W. H. Matthal, Baltimore, Md., National Enameling & Stamping Company.
- Robert Garland, Pittsburgh, Pa., Garland Nut & Rivet Company.
- Mr. Broadhurst, Philadelphia, Pa., Page Belting Company.
- C. D. Richmond, Chattanooga, Tenn.
- E. F. Cooper, Philadelphia, Pa., Henry Disston & Sons Company.
- A. L. Anderson, Atlanta, Ga., Anderson Hardware Company.
- Sims Bray, Atlanta, Ga., Anderson Hardware Company.
- Chas. W. Davis, Atlanta, Ga., Anderson Hardware Company.
- D. B. Prosser, Atlanta, Ga., American Iron & Steel Mfg. Company.
- S. L. Butler, Northampton, Mass., Northampton Cutlery Company.
- S. M. Block, Richmond, Va., M. T. Block, Son & Co.
- T. D. Stillwell, New York, Tower & Lyon Company.
- W. B. Wood, Cleveland, Ohio, Columbian Hardware Company.
- R. N. Peck, New Britain, Conn., Stanley Rule & Level Company.
- John Sheffield, Americus, Ga., Sheffield-Huntington Company.
- R. A. Clarkson, Fort Smith, Ark., Armstrong Hardware Company.
- S. B. Hubbard, Jr., Jacksonville, Fla., S. B. Hubbard Company.
- Paul Waddell, New Orleans, Barrett Mfg. Company.
- Jno. M. Wingfield, Dalton, Ga., Cordley & Hayes.
- R. M. Dudley, Nashville, Tenn., Gray & Dudley Hardware Company.
- J. W. Van Harlinger, Atlanta, Ga., Carnegie Steel Company.
- A. D. Rogers, Cincinnati, Ohio, Whitman & Barnes Mfg. Company.
- R. C. Scott, Tampa, Knight & Wall Company.
- Ira E. Gannaway, Lyby, Va., Ira E. Gannaway & Company.
- J. P. Cowan, Charlottesville, Va., Walker-Cowan-Adams Hardware Company.
- Reuben Jenkins, Athens, Ga., Athens Hardware Company.
- Geo. E. Eddy, Baltimore, Md., Henry Keldel & Co.
- D. I. Yerkes, Jacksonville, Fla., Florida Hardware Company.

L. U. New, Philadelphia, Pa., E. K. Tryon, Jr., & Co.
 E. M. Bush, Evansville, Ind., president Indiana Retail Hardware Dealers' Association.
 R. H. Lake, Greenville, Miss.
 A. W. Haley, Atlanta, Ga., Jno. A. Roebling & Sons Company.
 Thos. V. Hall, Jr., Atlanta, Ga., Jno. A. Roebling & Sons Company.
 Jas. C. Griffin, Erie, Pa., Griffin Mfg. Company.
 F. E. Lock, Paducah, Ky., Lock Singletree Company.
 Talley B. Graves, Atlanta, Ga., Hightower & Graves.
 Mark Hightower, Atlanta, Ga., Hightower & Graves.
 J. M. Couch, Atlanta, Ga., Couch Bros.-J. & J. Eagan Company.
 A. G. Couch, Memphis, Tenn., Couch Bros.-J. & J. Eagan Company.
 J. J. Eagan, Atlanta, Ga., Couch Bros.-J. & J. Eagan Company.
 J. E. Kirk, Atlanta, Ga., Couch Bros.-J. & J. Eagan Company.
 Jno. J. Mapp, New Orleans, La., National Enamel & Pltg. Company.
 Wm. E. Jones, Columbus, Ohio, Ohio Tool Company.
 Jno. C. Clark, Atlanta, Ga., F. Gardner's Sons.
 G. B. Nichols, New Britain, Landers, Frary & Clark.
 Wreatham Gathright, Atlanta, Ga., C. Atkins & Co.
 Jno. P. McNamara, Detroit, Mich., Michigan Stove Company.
 H. S. Willett, Houston, Texas, Allerton-Clark Company.
 Sam. D. Jones, Atlanta, Ga., Atlanta Stove Works.
 Billing A. Jones, Atlanta, Ga., Atlanta Stove Works.
 Jno. A. Dickey, Atlanta, Ga., Atlanta Stove Works.
 Jos. Irons, Atlanta, Ga., S. L. & G. H. Rogers Company.
 A. K. J. Alcorn, Atlanta, Ga., S. L. & G. H. Rogers Company.
 C. R. Normandy, Atlanta, Ga., S. L. & G. H. Rogers Company.
 W. M. Whitlock, Richmond, Va., M. Block & Sons Company.
 Jas. C. Deane, Greenfield, Mass., Goodell-Pratt Company.
 Jno. E. Avery, Atlanta, Ga., Union Metallic Cartridge Company.
 E. N. Stern, Cincinnati, Ohio, the Peters Cartridge Company.
 W. S. Hepley, Cincinnati, Ohio, the Peters Cartridge Company.
 N. C. Whitaker, Cleveland, Cleveland Hardware Company.
 Geo. Y. Coleman, Charleston, S. C., Coleman-Wagner Hardware Company.
 R. C. Scott, Tampa, Fla., Knight & Wall Company.
 Jno. E. Clark, Atlanta, Ga., King Hardware Company.
 A. McL. Martin, Charleston, S. C., Coleman-Wagner Company.
 J. D. Moore, Jr., Birmingham, Ala., Moore & Handley Hardware Company.
 William P. Moore, Birmingham, Ala., Moore & Handley Hardware Company.
 M. Carl, Montgomery, Ala.
 R. F. Maddox, Atlanta, Ga.
 Sam. D. Jones, Atlanta, Ga.
 E. J. Pauder, Coosa, Ga.
 F. E. Biddesen, Reading, Pa., Penn Hardware Company.
 W. M. Cosgrove, Columbus, Ga.
 M. A. Cook, Columbus, Ga.
 J. T. Du Bois, Bellaire, Ohio, Enamel Steel Tile Company.
 J. H. Drake, Richmond, Va.
 J. L. Cox, Columbus, Miss.
 C. G. Jones, Montgomery, Ala., B. W. Bennett Hardware Company.
 C. H. Bennett, Plymouth, Mich.
 A. J. League, Columbus, Ga.
 A. E. Bronson, Cleveland, Ohio, the Bronson-Walton Company.
 A. W. Armstrong, Hartford, Conn., the Capewell Horse Nail Company.
 H. S. Lemon, Memphis, Tenn., Benedict, Warren & Davidson Company.
 G. S. Davidson, Memphis, Tenn., Benedict, Warren & Davidson Company.
 F. E. Walker, Boston, Mass., Boston Woven Hose & Rubber Company.
 W. T. Parsons, Jacksonville, Fla., S. B. Hubbard & Co.
 Jno. G. Christopher, Jacksonville, Fla.
 W. L. Marshall, Easley, S. C., Easley Hardware Company.
 M. M. Koch, Cleveland, Ohio, the H. Franke Steel Range Company.
 Wm. Taussig, New York, Wiebusch & Hilger.
 A. Hilger, New York, Wiebusch & Hilger.
 Louis Hale, Sandersville, Ga.
 Wm. G. Smythe, Providence, R. I., American Screw Company.
 D. A. Merriam, Chicago, American Steel & Wire Company.
 W. J. Griffin, Rome, Ga., Griffin Hardware Company.
 H. J. Turner, Buffalo, N. Y., U. S. Hame Company.
 P. B. Noyes, Kenwood, N. Y., Oneida Community.
 C. P. Wilson, Atlanta, Ga., Columbus Chain Company.
 F. M. Higgins, New Britain, Landers, Frary & Clark.
 A. E. Wells, New York, Keuffel & Esser Company.
 T. A. Carter, Cleveland, Ohio, American Fork & Hoe Company.
 E. M. Cole, Newman, Ga., R. D. Cole Mfg. Company.
 L. C. Satterfield, Chattanooga, Tenn., F. H. Woodworth & Co.
 J. E. Annis, Chattanooga, Tenn., Chattanooga Roofing & Foundry Company.
 H. Backus, Atlanta, National Lead Company.
 H. W. McChin, Atlanta, American Sheet & Tin Plate Company.
 John W. Harrington, Worcester, Mass., Harrington & Richardson Arm Company.
 F. T. Ridge, New York, J. B. & J. M. Cornell Company.
 F. R. Darby, Asheville, N. C.
 H. J. Gelink, Birmingham, Ala., Empire Plow Company.
 W. F. Randolph, Asheville, N. C.
 J. H. Wood, Asheville, N. C.
 E. P. Grant, Rome, Ga., Standard Scale Company.
 H. A. Wagner, Lebanon, Pa., American Iron & Steel Mfg. Company.

Edwin Jackson, Nashville, Tenn., Prewitt-Spurr Mfg. Company.
 F. R. Dougall, Detroit, Mich., Acme White Lead & Color Company.
 R. M. Billings, Detroit, Mich., Acme White Lead & Color Company.
 Geo. H. Sargent, New York, Sargent & Co.
 Wm. E. Love, Jr., Chattanooga, Tenn., Mt. City Stove Company.
 Kirby Squires, Chattanooga, Tenn., Dewees Mfg. Company.
 C. D. Richmond, Chattanooga, Tenn., Price-Evans Foundry Company.
 Sam'l S. Early, North Easton, Mass., Oliver Ames & Sons Company.
 Hobart Ames, Boston, Mass., Ames Shovel & Tool Company.
 J. W. St. John, Atlanta, Ga., Detroit Stove Works.
 Garnett McMillan, Atlanta, Ga., J. J. Egan Company.
 A. C. Izard, Rock Hill, S. C., Sohy Company.
 John F. Oberly, Reading, Pa., Reading Hardware Company.
 G. P. Lowry, Atlanta, Ga., Taylor & Boggis Foundry Company.
 H. K. Rice, Cleveland, Ohio, Lamson & Sessions Company.
 Dan Arbuckle, Baltimore, Md., Gandy Belting Company.

Reading Hardware Company.

The Reading Hardware Company were represented at the convention in a manner which emphasized their enterprise and contributed in a marked degree to the pleasure and entertainment of all in attendance. Their representatives constituted a delegation of about 25 persons directly identified with the house, among whom were the following officials: J. E. Harbster, president; S. Y. Reyner, treasurer; G. N. Jacobi, sales manager; W. H. Bennett, Chicago manager; T. B. Hendricksen, Philadelphia manager; C. S. Packard, New York manager; B. Luer-sson, manager of advertising department; N. Rhoades, superintendent of the shipping department, and J. Harbster, Jr., inspector of the packing room. These gentlemen, with the attaches of the delegation, went to Atlanta in a special car from Philadelphia, accompanied, in another car, by the Philharmonic Band of Reading, 25 pieces, the Apollo Mandolin and Guitar Club and the Amphion Male Quartette. On the arrival of the special train at Atlanta the band preceded the large delegation to the Kimball House, where they were quartered during the sessions of the convention. Not only at the smoker tendered by the American Hardware Manufacturers' Association to the Southern jobbers did they present an elaborate programme—a marked courtesy which was greatly appreciated by the visitors—but whenever occasion offered during the week this musical talent was at the service of those attending the conventions. On the return trip, as on the outgoing, the special train enjoyed a like treat. The company also gave out with great liberality a variety of souvenirs, which were much sought after. These included an elaborate plaque, which was a fine specimen of casting and hand painted, buttons, lizards and other articles, together with a very attractive souvenir in the form of a finely printed pamphlet descriptive of Atlanta, and illustrating in artistic pictures many of the buildings, parks and other points of interest in the city. An impressive view of the beauty and importance of this growing center was thus given. It also contained a description of Reading, whose attractiveness and business position were similarly treated. In the parlors of the Kimball House, which were the headquarters of the company, there was a most attractive display of the products of the company, especially in the line of artistic Hardware, and many courtesies were dispensed to the host of visitors.

CONVENTION NOTES.

While the sessions of the conventions were all held in the Kimball House, most of the manufacturers and some of the jobbers were at the Piedmont Hotel, whose lobbies presented a busy scene and were much frequented. The capacity of both houses was taxed to its utmost, but by the special efforts which they put forth they succeeded in rendering their guests comfortable, and the delegates carried away pleasant recollections of the hostleries of Atlanta.

The mention in *The Iron Age*, May 26, of the death of Herbert S. Smith of Westfield, Conn., was understood by some as referring to F. Herbert Smith of Indianapolis, whose friends were relieved to find him in the best of health and very much alive at the Atlanta conventions, where he efficiently represented E. C. Atkins & Company, with whom he is identified.

REBATES AND RESTRICTIVE PRICES FROM MANUFACTURERS OF ASSOCIATION GOODS VS. OPEN MARKET.

BY JOHN DONNAN, W. S. DONNAN HARDWARE COMPANY, RICHMOND, VA.

Among the many interesting subjects selected for discussion at this, our annual convention, I know of none more timely than the one decided upon for the first joint debate between the manufacturers and jobbers—namely, "Rebates and Restrictive Prices from Manufacturers of Association Goods vs. Open Markets." Not only is it timely, but it is of the utmost importance to both the manufacturer and jobber that for the future a clearly defined policy should be determined, for conditions have reached a point which makes it imperative that some positive stand, one way or another, must be taken, and in deciding upon the correct policy to be pursued the manufacturer has as much at stake and is interested to as great a degree as the jobber.

In reflecting upon the best manner in which I should discuss the subject, I have decided to present it as follows:

First.—Conditions as we find them to-day.

Second.—Some of the reasons why such conditions exist.



JOHN DONNAN.

Third.—Why the manufacturers are the only ones possessing the ability to apply the remedy.

In thinking of some of the conditions which we find existing to-day, one logically concludes that, if the ability of Hardware jobbers is to be judged by the manner in which some of us conduct our affairs, either at birth we did not have a grain of sense, or if at that period we were endowed with even that small amount, it would be necessary for us to attain the age of Methusaleh in order to gain the amount of intelligence possessed by the average man. It is a severe charge, but is it unjust, or undeserved, based upon the policy some of us pursue in the conduct of our business and the small percentage of profit which we ask upon many of our leading lines? There are many who dislike to listen to stern, hard facts, and are always unwilling to have plain, unvarnished truths told them, even though deserved. But, says an old poet, "Shall truth be silent because folly frowns?" No, for there are times when we are truer and more loyal to both ourselves and our friends when we speak plainly and look at cold, bare facts as they actually are. What are some of these facts? One, and it mortifies me to admit it, is the

INABILITY OF THE JOBBER TO CONTROL HIMSELF.

His daily acts prove that he does not possess that ability, and that he is absolutely in need of a guardian, or a restraining influence of some kind. Is it possible to conceive of any one in possession of a calm and well balanced mind selling Poultry Netting at 85 per cent., based upon

a cost of 85 and 5 per cent., especially when not only our various association, but the manufacturers as well, had made a special request that a price of 80, 15 and 5 per cent. should be maintained? Yet we know it to be a fact that such a price has been of daily occurrence all the season.

Would a jury of 12 sensible men decide that houses which, all this year, had sold Plow Shapes at 10 cents per 100 pounds margin, or a profit of between 2 and 3 per cent. upon cost, were capable of self government, especially when told by these very jobbers that it cost them from 14 to 15 per cent. to conduct their business? Many other lines, such as Handled Hoes, Cast Plows, Axes and Shot—all sold at margins much too close—could be mentioned; but the lines named suffice to show facts, as they exist, that the jobber either will not or cannot control himself.

Surely, merchants possessed with the intelligence and business ability of the Hardware jobbers of America must have good reasons for their apparently foolish course; which leads me to conclude that we must go deeper into the subject and try to find some of the reasons why such conditions exist.

Among some that I think can be mentioned are the changed conditions existing in this country, so different from those which surrounded our predecessors. In former years business was to a very great extent localized, each jobber having his regular line of customers, who were sold at a good round profit, when they came to market twice a year; and while, of course, even then there was competition and the amount of business done per annum was small, yet the keen competition of the present did not exist and the margins of profit were much larger. With the advent of railroads and telegraphs

CONDITIONS CHANGED,

and all sections of the country were brought into close proximity; consequently, Atlanta, Louisville, St. Louis and Richmond to-day compete for the same trade, and while the opportunity of each jobber for doing a large business has greatly increased, yet, on the other hand, competition has become proportionately greater; hence one of the causes for reduced profits.

Another reason is that there are certain large houses in this country who are laws unto themselves; who, for reasons known only to them, positively refuse to become members of either the Southern or National Associations, and are, therefore, not surrounded by restraining influences. These houses, in numberless instances, are great cutters, using lines such as Single Barrel Guns, Poultry Netting, &c., as leaders, and selling them at prices far below the cost of doing business. Such being the case, what are the jobbers who compete with them to do? Shall they stand by quietly and allow these great houses of other States to come into their own territory and take their legitimate trade from them, or shall they meet the prices made on leaders by these pirates, with the hope of bringing up the average on lines not cut? Alas! how few they are. Were it possible for the jobbing Hardware trade to agree and settle upon certain staples for leaders, and then make a legitimate margin of profit upon the remainder of the line, the trade at large could then afford to stand a loss on the leaders; but when the jobbers not only make such goods as Poultry Netting, Plow Shapes and Handled Hoes leaders, but cut deeply into their profits on shelf goods as well, conditions have become alarming in the extreme and something must be done.

CUTTING DOES NOT GAIN CUSTOMERS.

One other reason I will suggest for the existence of such conditions: Young and inexperienced firms starting business for themselves, and taking their cue from the large jobbing houses, have an idea that it is necessary to cut in order to gain a reputation and establish themselves with the public as first-class jobbers. Their ideas are totally erroneous, for they forget one of the fundamental principles of trade, which is that cutting does not gain a customer, but only makes a competitor lose his profit. They, unfortunately, fail to remember that the most successful jobbers are not those who have been cutters, but the ones who have had the nerve to ask a profit; not those

who try to see how near to cost they can sell, but those who keep as far away as possible from the danger line.

RESTRICTED VS. UNRESTRICTED LINES.

Now, gentlemen, having endeavored to tell you some of the conditions confronting us, and the reasons therefor, I will try briefly to state some of the advantages of restrictive prices as against open markets, and why the manufacturers are the only ones able to apply the remedy. I do not think my statement will be questioned when I say that, without doubt, the lines which the jobbing trade sell under restrictive prices are, from the standpoint of profit, decidedly the most satisfactory ones which we have to handle. But even beyond the satisfaction of profit there are other advantages. For instance, when a jobber receives a letter requesting a quotation on a restrictive line, the price is made with the greatest degree of satisfaction, for he not only feels, but knows, that, even though he does not receive the order, it is not because he has been under-quoted, but simply because the party preferred to buy, at the same price, from a competitor, for each of us has friends who always give us the preference, everything being equal.

Again, are not the letters of complaint from our salesmen confined almost exclusively to unrestricted lines, and is it not a fact that they rarely, if ever, have a word to say about their inability to sell those lines which are restricted?

Have you ever known any of them to say that their sales were in the least bit curtailed on goods, appended to the selling price of which in their cost books they found the words "No deviation?" I think not.

Let us for a few moments contrast the difference which exists in lines once sold on an open market and now controlled. What would be the condition of Loaded Shells to-day under an open market, 'tis useless to ask, for you know only too well that it would be cost. You ask, Would any one be so simple as to sell a line at cost, involving such an outlay of capital, even under an open market? In answer I refer you to the facts, and ask if, even under the most powerful restraint and under sworn statements to the contrary, there were not some who divided their rebates? If these parties try to be demoralizers under the most powerful restraint, one can well imagine what damage they would do to the country at large if given the privilege of pursuing any policy they chose.

Again, contrast the Plow Shape situation of this season, upon an unrestricted basis, with that of last season, thoroughly controlled. Was there ever such a difference? Last season's business perfectly satisfactory and upon a most profitable basis, for so staple a line; this season's, a disgrace to us who handle them, and a positive proof of the fact that we possess neither the sense nor the ability to control ourselves.

HORSESHOES.

Many other unrestricted lines could be recalled, such as Handled Hoes and Shot, but I will mention only one other to illustrate the jobber's consistency of selling as near as possible to cost—viz., Horseshoes. Upon a base cost of \$3.50 at Pittsburgh the manufacturers had given the trade a rebate of 15 cents per keg to a 2000-keg buyer, a profit of a shade over 4 per cent.—small enough, in all conscience; and yet, strange to say, in many instances, even this profit was divided in half. Gentlemen, whither are we drifting and to what are we coming? If we are to make leaders of all staples, and in many instances encroach upon the profits of our shelf lines, will some one tell me, if left to ourselves, how we are to make our dividends?

A CRISIS.

Says Bulwer, in one of his novels, "There are certain crises in life, which leave us long weaker, from which the system recovers with frequent revulsion and weary relapse, but from which, looking back, after years have passed, we date the foundation of strength, or the cure of disease." I am neither a prophet, nor the son of one, but in observing the trend of events, it does seem to me that the jobber has reached a crisis in his history. When I state that it has been demonstrated that we have reached a point in our career, where our inability to

control ourselves must be admitted, and that, therefore, we must be controlled, I make no reflection upon the business ability of the average jobber, for I consider the twentieth century Hardware merchant a man of ability and intelligence second to none, otherwise he could not occupy his present position in the mercantile world. But as there are winds and storms at sea, which strain and sometimes founder even the stanchest ships, so there are, to-day, circumstances surrounding the jobbing Hardware trade as a whole, over which they have no control, making it absolutely necessary for us to call the manufacturer to our assistance.

Based upon every law of equity, a merchant is entitled to a legitimate profit upon his investment of capital and brain, and, in some way, should be protected from those who would prevent his earning the profit, which is so justly his due. The majority of the Hardware-jobbers are merchants thoroughly conversant with the cost of doing business, and fully impressed with the necessity of making a profit, in order to reap the results to which they are rightly entitled, and would do so, where it possible; but there are several classes of competitors by whom they are surrounded and over whom they have no control whatever, and I will mention them, for all should and can be easily controlled by the manufacturer, under the restrictive selling price plan, none of whom can be even influenced by the jobbers, who would make a profit.

DEMORALIZING INFLUENCES.

The first class to which I allude are the department stores and catalogue houses—a class that will take certain lines, such as Saws, Screws, Meat Cutters and Strap and T Hinges, and cut the prices until the profit is microscopic. Now, this is the class of goods which the jobbers term their shelf line, and upon which they expect to make a fine profit, in order to equalize the small per cent. at which they are compelled to sell the more staple lines. Is it possible for the jobber to control these?

Another class are those who are just commencing business, those novices who wish to teach the old fogies, or profit-makers, how an up to date house should conduct its affairs. Those, who, in their dense ignorance, never having figured the cost of doing business, awake in a few years to find themselves rich in experience, but financially poor. What protection has the would-be profit making jobber from these? And, remember, a new crop appears each year.

And last, but not least, I will mention a class easily ranking first as the greatest of all demoralizers, the so-called larger jobbers, those would-be planets, around which the smaller jobbers, as so many satellites, are supposed to revolve, a self-elected coterie of would-be Gamaliels, at whose feet the smaller jobbers are expected to sit to imbibe all Hardware lore; those arrogant firms whose buyers always ask the factory's representative, "Have you a special price for me?" Those firms, too large to be members of any association, and so high and mighty that they resent at once having a restriction put upon any policy they may elect to pursue, no matter how detrimental to the interests of the jobbers of the country at large—these are your greatest demoralizers. They travel extensively and cover every section of this broad land, and whenever it suits their purpose to do so they use, as leaders, such lines as Poultry Netting, Guns, &c., at, or near, cost, regardless of the fact that by so doing they are crushing the profit out of same, and preventing the other jobbers of the whole country from making the profit which they otherwise would. "O! 'tis excellent to have a giant's strength, but it is tyrannous to use it like a giant."

Gentlemen of the Manufacturers' Association, are these underminers to be allowed to roam at large and prey at will upon our profits? Are these juggernauts, unrestrained, to be laws unto themselves forever, when you possess the power to control them? Or are you afraid to use the power you possess? If so, why should you? Are they the giants they seem? I think not, for things are great or small by comparison. The Blue Ridge is a great range of mountains, but contrasted with the Rockies, is small. Lake Superior is a large body of water, but compared with the ocean, it sinks into insignificance. As with things, so with merchants, and

compared with the 200 or more recognized jobbers of this country, the so-called large jobbers are few. When discussing among themselves the subject of restrictions and rebates

A CERTAIN AMOUNT OF TIMIDITY

seems to exist with the manufacturers. One appears to say, "We should approach the subject of restricting prices with great care, for such and such a firm handles from 10,000 to 15,000 dozen Axes." Another seems to say, "Much caution should be used in deciding upon the rebates we should give, for so and so handles, of our make alone, 25,000 kegs of Shoes per annum." Well, granted they do, isn't it an absolute fact that for every house handling 10,000 dozen Axes, you sell to the jobbers, competing with them, 75,000 dozen? And isn't it also equally true that while there are firms to whom, individually, are sold from 25,000 to 50,000 kegs of Shoes, yet, speaking of association Shoes alone, that the South handles 250,000; New England, 250,000, and the West and Central West, 500,000 kegs? Consequently, how infinitesimally small is the purchaser of even 50,000 kegs compared to the 1,000,000 kegs handled by the country at large!

IS IT RIGHT,

then, that 5, 10 or 20 so-called large jobbers should remain unrestricted, and be allowed, at will, to demoralize the business of fully 200 recognized jobbers? Are you true to your own interests when you allow it? Have you not long since been convinced, that it is much more to the interest of any manufacturer to have his line distributed among the many jobbers of this country than to have the whole output of a factory taken by a few large jobbers? Such being the case, isn't it to your interest to see that your lines, handled by the jobbers at large, are sold by them at a profit so desirable that it is to their interest to handle them continually? If such is the case, isn't it vital to your interests to see that your goods are not slaughtered? and how can you, in a better manner, bring about this desirable condition, than to put your lines upon the rebate and restrictive selling price plan?

Taking into consideration the conditions which exist in our country at large, and carefully analyzing the causes therefor, can any other plan be suggested by which jobbers, both large and small, can be controlled? and is it possible to devise any other scheme so equitable to all of every section? Rebates, in themselves, are right, and should be given to those entitled to, and who retain them, but rebates without restriction have proved one of the great causes of cut prices. That a jobber should deliberately throw away the profit a manufacturer has tendered him is a species of folly inexplicable, and a mystery past understanding; therefore, to be effective and subserve the purpose of absolutely controlling the jobber, rebates and restriction must go hand in hand and never be divorced.

AS ILLUSTRATIVE OF A LINE

in the sale of which, all things considered, there is perfect equity to all, I can conceive of no plan more perfect, if, in addition to the rebate, there was a restrictive selling price, than that now used by the Horseshoe Association. These goods are sold at an f.o.b. base price at Pittsburgh, with a 30-cent rebate to a 2000-keg buyer. If salesmen representing St. Louis, Louisville, New Orleans and Atlanta should meet at any point, there is no necessity, in the effort to secure the order for Horseshoes, that any one of them should make a cut of a single cent. Each stands upon exactly the same footing for shipment from factory, and almost, if not entirely, from stock. If the customer wishes the shipment of ten kegs to go from factory, each salesman is obliged to make the Pittsburgh base price, plus the less carload rate to point of destination, with freight deducted. If the customer wishes a smaller quantity to come from stock, neither of the competing salesmen can make a lower price than the Pittsburgh base price, plus the less carload rate of freight to the city whence the shipment is made; the customer then paying the freight from the city in which he has purchased the Shoes to his place of business. If the manufacturers of Horseshoes could only be induced to make the jobbers' selling price restrictive, so that no part of the rebate could be given away, the plan would be al-

most perfect, because, then, every jobber from Maine to the Gulf, and from the Atlantic to the Pacific, would stand so nearly upon an equal footing that there would be no reason for cutting or incentive to cut in order to secure business.

It is upon this rebate and restrictive selling price plan that I would put Handled Hoes, Poultry Netting and many other lines that could be mentioned. Give us on all staples a plan worked out upon the same line as Horseshoes, only with the rebates coupled with restrictive selling prices, and you will not only control both the large and small jobbers of every section and make us pocket thousands of dollars, which we otherwise would not, but you will succeed in solving the most difficult problem that to-day confronts the Hardware trade of every section—namely, how to market our staples at a profit. Nor by this plan is the jobber hampered, but his opportunities of expanding are greatly increased.

Far be it from me to be so narrow as to limit the territory of any up-to-date and progressive merchant, but rather to accord him the privilege of selling his goods in any part of this broad land, for in this vast country there is room and to spare for all.

NO BROAD MINDED JOBBER FEARS HONEST COMPETITION.

It is healthful in its influence, it keeps us wide awake and on the *qui vive*, and inspires us with that snap and up-to-dateness so necessary to make us keep abreast of the times, and one is unworthy the name of jobber if, all things being equal, he cannot hold his own in any section. But while I accord to competitors from any section of this country the privilege of coming into my territory and selling goods upon equal terms and prices with me, yet I do most earnestly protest against their having the right to be demoralizers of the prices there existing and thereby preventing the jobbers of my section from making the profits which they otherwise would, and for this reason I reiterate we should all be controlled.

Are there any who object to being controlled? They are the very ones who should be, for in their hearts they know full well that they are the would-be demoralizers. Is it the law abiding citizen of any country who objects to laws restraining influence? Were laws and punishments instituted for others than violators? Harmony exists only in everything that is controlled, from the minutest piece of mechanism to the greatest of the heavenly bodies, and chaos reigns, and always will, where control is absent; therefore, I contend we must be controlled. Our very existence depends upon it.

CAN THE MANUFACTURERS AFFORD TO SEE THE EXISTENCE OF THE JOBBER THREATENED?

No; a thousand times no, for they have long since concluded that he is the medium through which their products can be marketed in the most economical manner. Gentlemen of the Manufacturers' Association, nothing should make the jobber view the future with so much hope and optimism as the knowledge of the fact that you are thoroughly organized; but with us it is so different. While our two associations, the Southern and National, influence to a considerable extent the policy of the larger proportion of the prominent jobbing houses of this country, yet, as I have endeavored to show, they are surrounded by demoralizing influences outside, over which neither has any control, the most conspicuous of which are ignorance and folly in the conduct of business on the one hand, arrogance and presumption on the other, and it is from these that the would-be profit makers ask your protection. The manufacturers of any particular line are comparatively few, and can not only define the plan upon which they wish an article marketed, but can absolutely control both its output and selling price in every section of the country. It is for this reason, and knowing, as we do, that we have your co-operation in our every endeavor to overcome existing evils, that we face the future with the feeling that brighter days are ahead.

If in the future you continue to pursue the conservative policy of the past your power for good will prove inestimable; besides, meetings and joint debates like these not only cement the friendship and esteem in which each holds the other, but signalize the fact that our interests and aims are identical, that each is the comple-

ment of the other; and may our motto, like that of the old Blue Grass State, ever be, "United we stand; divided we fall."

RICHARDS MFG. COMPANY'S NEW PLANT.

THE RICHARDS MFG. COMPANY, Aurora, Ill., have recently moved into their new factory in the southern part of town. The main building is 80 x 200 feet in size, with separate buildings for boiler house, japanning room, lumber shed, &c. The factory is located on a 4-acre tract of land bought by the company adjoining the C. B. & Q. Railroad, and they have a private switch 350 feet long, which, in conjunction with their loading and unloading platform at the side of the building, gives them facilities for loading direct from their finishing room to cars and unloading raw materials in the same way direct to their stock room, with the minimum handling in both cases. Power is furnished by two motors set on overhead staging, the current being furnished by a local power company. The factory is equipped with a complement of modern brakes, presses, punches, bulldozers, shears and other machinery designed for the manufacture of Barn Door Hangers, Fire Door Fixtures, Store Ladders and similar goods. The company make their own dies, tools and special machinery, and also have a special apartment in which they manufacture their own shipping boxes. They estimate that the manufacturing cost on their line will be decreased from 10 to 15 per cent. because of the greater convenience of the new plant and by the use of labor saving machinery, which could not be utilized in their old factory.

PRICE-LISTS, CIRCULARS, &c.

Manufacturers in Hardware and related lines are requested to send us duplicate copies of catalogues, price-lists, &c., one copy for our Catalogue Department in New York and another for our London Office; and at the same time to call our attention to any new goods or additions to their line, of which appropriate mention will be made, besides the brief reference to the catalogue or price-list in this column.

DETROIT LEATHER SPECIALTY COMPANY, Detroit, Mich.: Pump Leathers, including Crimped and Uncrimped Plunger, and Lower Valve Leathers.

THE WEYBURN COMPANY, Rockford, Ill.: Plow Shares, Agricultural Shapes, Eveners, Plow Jointers, Tire Shrinkers and Benders, Tuyere Irons, Anvil Punches, Swivel Clevis, &c.

TRETHAWAY BROTHERS, Parson, Pa.: Acme Dinner Pails, Miners' Lamps, Waste Cans, Oil Cans, &c.

INTERNATIONAL SILVER COMPANY, 9-13 Maiden lane, New York: Catalogue No. 76, just issued, devoted to the Star Rogers & Bro. A1 Brand of Electro Silver Plated Spoons, Forks, Knives, &c.

HOLTZER-CABOT ELECTRIC COMPANY, Boston, Mass.: The Holtzer Magneto Watchman's Clock, in different styles.

AMERICAN LINO OIL COMPANY, Cleveland, Ohio: Lino Oil for painting; Commercial Turpentine and Crown Belt Dressing. A pamphlet is devoted to each of these lines.

FARWELL, OZMUN, KIRK & Co., St. Paul, Minn.: Retail dealers' selling price-list. This is offered as a guide to retailers in selling goods not carried in stock, and for information regarding fair average retail market values of Hardware generally.

TOBIN ARMS MFG. COMPANY, INCORPORATED, Norwich, Conn.: Catalogue devoted to a line of Hammerless Simplex Guns. Five styles are shown which are carried in stock and four styles which are made to order. The experience of the manufacturers is that there is a demand for a thoroughly reliable, well made Hammerless Gun of medium price.

ECLIPSE MACHINE COMPANY, Elmira, N. Y.: Morrow Motor Cycle Hub Coaster Brake. This is illustrated on and off of a Motor Cycle.

H. H. MAYHEW COMPANY, Shelburne Falls, Mass.:

Catalogue No. 11 relating to Screw Drivers, Braces, Glass Cutters, Combination Gauge and Square, Tack Claws, Wood Boring Brace Drills, Gimlet Bits, Gimlets, Counter-sinks, Screw Driver Bits, Punches, Nail Sets, Reamers, Ice Picks, Awls, Riffles, &c.

THE J. D. WARREN MFG. COMPANY, Chicago, issue a four-page folder, the first and last pages of which are devoted to information about the World's Fair, including a map showing the location of their model Hardware store exhibit in the Varied Industries Building. The inside pages contain a picture of the Masonic Temple, Chicago, and a plat showing the location of the exhibition rooms and the offices of the company.

Trade Winning Methods.

ADVERTISEMENTS AND LEAFLETS.

WE are in receipt from the John E. Bassett & Co., New Haven, Conn., of a few leaflets, two of which are represented in the accompanying reproductions. These leaflets are 3 x 5 inches in size, and beside those shown herewith relate to such subjects as the following: "Some Kitchen Specialties," "Vacation Notes," "Flower and Garden Seeds," "Dog Collars," &c. Many of these are bright and interesting, referring in an attractive and ingenious way to the goods to which they relate. For example, one of them, preparing the way for calling attention to Dog Collars, begins as follows: "The costume of your dog is as limited as that of 'our little brown brother,' who is clothed only in his right mind and a cartridge belt, and therefore your dog to be dressy should have his only article of clothing, his Collar, as stylish as possible." Another leaflet, relating to the line of kitchen utensils carried, is in substance as follows:

A BOUQUET

WE have never had enough bouquets thrown at us to really become blasé regarding them and we received one the other day that greatly pleased us. A celebrated exponent of the culinary art, who recently lectured in town, announced in one of her lectures that such cooking utensils as she used could be found at our store, as we had the most complete assortment of such things she had ever found in a city of the size of New Haven.

And the really pleasant part of it was that we deserved the compliment and it cost us nothing.

Had you found it out?

The John E. Bassett & Co.

754 Chapel St. 320 State St.

These leaflets are suggestive for two reasons: First, because they are reproductions of advertisements in the daily paper and the expense of composition on the leaflets is thus avoided, as a few hundred copies are struck off while the type is still standing. The slips are generally sent out with their daily bills and monthly statements, and in other ways distributed. This method is referred to as often bringing excellent results.

The trade will recognize the care and skill with which this advertising matter is prepared instead of being done in a perfunctory manner, as is too often the case in the advertising of Hardware merchants. The best thought

**A DOG
and
HIS CLOTHES**

NATURE provides his coat, a little exercise furnishes his paws and good sense knows he gets cuffs enough. Surely his friends should be willing to furnish his collar.

We have recently received several new and exclusive patterns of collars and among them some very swell blue collars with white edges and jeweled studs. We think them the handsomest we've ever seen.

Our line comprises over 130 patterns ranging in price from

15 cents to \$5.00

LEADS, WHIPS,
BLANKETS,
BEDGONES.

The John E. Bassett & Co.
754 CHAPEL ST. - 320 STATE ST.

That Mat Matter.

The approach of spring entails on us a double duty. We must keep our yards in trim. Or our guests will have to be disappointed. From prime black with red and white stripes.

Whether the Spring is backward or not there'll be nothing backward about the mat. It will be right on top every time—also under foot. A small investment in a door mat will save itself in carpets and cleaning.

We have mats of cocones, of steel and of wire—each the best of its kind—in all the usual sizes. The prices are not so high as the quality.

COCO MATS, . . . \$1.25 up.
STEEL MATS,90 up.
WIRE MATS,1.50 up.

The John E. Bassett & Co.
754 CHAPEL ST. - 320 STATE ST.

is given to calling the attention of the public to the establishment in such a way as to make the announcement of interest, and thus exceptionally resultful.

THE JOHN LUCAS & CO. FIRST-PRIZE PAINT WINDOW.

DURING 1903 John Lucas & Co. of Philadelphia, Pa., manufacturers of Paints, offered prizes for a show window display contest, the awards for which were made several months since. The display which took the first prize of \$50 is shown in the accompanying illustration, the window being that of the Springfield Hardware Com-

pany of two prizes, third and fifth, aggregating \$40, two years ago, in a similar competition.

The results in the sale of Paints by Hardware men who enter such competitions are very satisfactory. The prizes are an incentive to put forth their best efforts in arranging the displays, which are usually meritorious enough, even if not prize winners, to attract more than passing attention from the public. Reports from nearly every section of the country indicate the tendency, which is very marked, toward the sale of Paints, Oils and related goods by hardware merchants, who are becoming more and more the recognized distributors of this line.

LARGE HARDWARE CONTRACTS PLACED.

ORR & LOCKETT HARDWARE COMPANY, Chicago, have been awarded the contract for Hardware for the new Chicago office building of the Chicago & Northwestern Railway Company by Frost & Granger, architects. The contract will aggregate about \$15,000. The same firm have also secured the contract for Hardware for a residence being erected by Mrs. Augusta Lehmann. This will be one of the most elaborate Hardware installations made in Chicago, as most of it is gold plated and will be made in special designs to carry out the general scheme of the residence. The contract aggregates about \$7000. Other Hardware contracts soon to be let are for the Adams Building, State and Adams streets; the Savings Bank Building, State and Madison streets; Union League Club addition; First National Bank addition; Rector Building, Clark and Monroe streets; Otto Young Building, Madison street and Wabash avenue; Lehmann office and theatre building, State and Monroe streets, and the Thomas Orchestra Building, Michigan avenue.

C. E. JENNINGS & Co., 42 Murray street, New York, are enlarging their factory at Yalesville, Conn., where they



THE JOHN LUCAS & CO. FIRST-PRIZE PAINT WINDOW.

pany, Springfield, Ohio. The contest only called for 11 prizes, but a number of windows were each awarded \$5, which made the total number of prizes distributed 16.

The center piece of the display was the skeleton of a cottage entirely covered with half pints and pints of mixed paints. The surroundings consisted of paint cards and products. In this contest originality alone counted 45 points, and it is understood that the competition for 1904 will be largely based upon results from the display. The Springfield Hardware Company were also the re-

are and have been running on full time in the production of Augers, Bits, Chisels and line of Mechanics' Small Tools, which are the principal products of that one of their various factories. At the Jennings & Griffin Saw Works, Port Jervis, N. Y., they are also enlarging their factory. They report business at all their plants in a very satisfactory condition. In their export trade they find existing conditions likewise satisfactory, both as to volume, widespread distribution and price. It is their business policy always to cultivate the foreign

trade over a large territory, a most important feature of which is the maintenance of fixed prices based on manufacturing costs, not altering them unless absolutely compelled to and then as conservatively as possible.

BRITISH LETTER.

Offices of *The Iron Age*, HASTINGS HOUSE,
NORFOLK ST., LONDON, W. C., May 14, 1904.

The Week's Hardware Trade.

TO-DAY the factories are closed down in all Hardware centers, some to open on Wednesday morning, but a large number will be idle for the week. During the past fortnight we have had beautiful weather, and this has stimulated the hitherto languid demand for season goods, but business is below the average of the season in most Hardware products. There is, however, fairly steady employment on orders for Tubes, Edge Tools, Garden Rollers, Watering Cans, Syringes, Carriage and Ship Lamps and Fittings, and traveling requisites. Inquiry is stronger for Builders' Hardware, Baths, Door and Window Fittings, but the building trade as a whole is not strong. This is probably due to the want of ready money in the market for speculative work. The South African demand continues poor, but increased orders have come from India, Australia and South America.

American attention should be particularly directed to the Sporting Gun trade, which is now showing some signs of life, but the business done is below average. The most disquieting feature is the lack of demand from home buyers, but the shipping trade is normal. The moderate condition of the Sporting Gun trade in England contrasts unfavorably with Belgium, where the pressure of work is causing prices to advance hand over hand. This is set down almost entirely to the demand for such goods from the United States. The Revolver trade advanced prices 20 per cent. a week ago, and a further advance is talked of. Rifles also are rising and Barrels are expected to follow suit, as the Seriang steel of which they are made cannot be turned out fast enough to meet the demand. Cheap Sporting Guns are in request for the United States, and it is for this market that some of the leading Liège makers have as many as 30,000 Guns on order.

A New Hafting Material.

Sheffield Cutlery manufacturers have had their attention drawn to the latest "substitute," the great advantage of which, as compared with celluloid, is its non-inflammability. It is called galalith or galalite, meaning milk-stone, and is produced by mixing with formaline the chemically precipitated casein from skimmed milk. A horn-like substance is the result, and it is contended that it can be used as a substitute for horn, ivory, celluloid, vulcanite, &c., in the manufacture of Handles for Knives and Forks, and indeed for a hundred other purposes. Its chief properties are alleged to be insolubility, elasticity, and that it can be worked up very easily.

Eight Guinea Cycles.

In one of my recent market reports I mentioned that a movement had been made for a standard eight-guinea Cycle. The company to start is the Swift, and it is no exaggeration to say that it has created consternation among not only the first rank makers, but even those whose name is associated with second qualities. There can be little doubt as to the importance of the step taken. It marks an epoch in the trade like unto that which the coming of the ten-guinea Bicycle did from the Rudge-Whitworth five years ago. The wisdom of the Swift Company's decision is considered to have been justified already in the flow of orders which has followed the announcement, though whether a week's experience amounts to more than a guide for the present season remains to be seen. What will be the effect on other manufacturers is also uncertain, but it is probable there will be some further clearances of stock at least on lower terms than the hitherto standard ten guineas. Otherwise the Swift Company's rivals may be left with stock at the end of the season, and it has to be borne in

mind that only three months remain to close most of the Cycle companies' financial years.

Hardware in an Australian Store.

An observant correspondent in the *Ironmonger*, in doing the round of a number of Hardware stores in Australia, gives the following useful list of Hardware goods and their origin in a Melbourne store. It is to be regretted that the American names are not always mentioned, but in any event American exporters who are anxious to cultivate this trade will be interested in knowing exactly who are their competitors from Great Britain:

Brass Foundry (Builders', &c.).—James Cartland & Sons, Birmingham, and Hartcourt's, Limited, Birmingham.
Tools generally.—American makers and some Marples.
Planes.—Stanley Rule & Level Company, New Britain, U. S. A., and Alex. Mathieson & Sons, Glasgow.
Saws.—Practically all Henry Disston & Sons, Philadelphia.
Files.—Mostly Henry Disston & Sons, Philadelphia.
Chisels and Adzes.—Ward & Payne, Sheffield.
Axes (handed).—American makers unquestionably.
Hammers.—Mostly American.
Rules.—John Rabone & Sons, Birmingham.
Tapes.—James Chesterman & Co., Sheffield.
Augers and Bits.—Mathieson & Sons, Glasgow.
Twist Drills.—Cleveland Twist Drill Company, Cleveland, Ohio.
Screws.—Guest, Keen & Nettlefolds, Limited, Birmingham.
Padlocks.—American and some English.
Rim Locks.—Mostly English, by Vaughan; J. Legge & Co., Willenhall; Carpenter & Tildesley, Burrows, Reeves & Co., Willenhall, and some of Russell & Erwin, Upper Thames street, London, E. C.
Electro Plated Goods.—Sheffield, mostly James Dixon & Sons, Sheffield.
Cutlery.—Mostly Harrison Brothers & Howson, Joseph Rodgers & Sons, Limited, Christopher Johnson & Co., and Lockwood Brothers, all Sheffield.
Ammunition.—Eley Brothers, Limited, Gray's Inn Road, London, W. C., and Union Metallic Cartridge Company, Bridgeport, Conn.
Guns.—English makers and some American.
Rifles.—American makes.
Cast Hollow Ware.—T. & C. Clark & Co. of Wolverhampton.
Cast Shelf Goods.—Archibald Kenrick & Sons, West Bromwich, and American makers.
Enamelled Ware.—Wm. Robinson & Co., Limited, Wolverhampton ("K" brand), and Kemp Mfg. Company, Toronto.
Oil Heaters.—American makers.
Lamps.—The cheaper lines of English, and the table Lamps of American and English, manufacture. The hanging Lamps are nearly all American.
Tacks.—American makes.
Mangles.—English makes.
Wringers, with India rubber rollers.—American makes.
Fishing Tackle.—Bartleets and Samuel Allcock & Sons, Redditch.
India Rubber Hose Pipe.—North British Rubber Company, Edinburgh, and some American cotton covered.
Spades and Forks.—A. & F. Parkes & Co., Birmingham, and C. T. Skelton & Co., Sheffield.
Shovels.—A. & F. Parkes & Co., Birmingham; William Hunt & Sons, Limited, The Brades, near Birmingham, and American manufacturers.
Cheap Tools generally.—German manufacturers.
Light Gardening Tools.—American manufacturers.
Garden Sets.—Ward & Payne, Sheffield, and Wm. Marples & Sons, Limited, Sheffield.
Vises.—J. Parkinson & Co., Shipley.
Emery Wheels.—Norton Emery Wheel Company, Worcester, Mass.
Small Colonial Pumps.—W. & B. Douglas, Middletown, Conn.
Scales.—Avery's mostly, W. & T. Avery, Limited, Birmingham.
Hooks and Slashers.—Whitehouse.
Sash Line.—James Austen & Son, Dysart street, E. C.
Wrought Tubes.—Stewart & Lloyd's, 50 Cannon street, E. C., and American and German.
Fencing Wire.—German manufacturers.
Barbed Wire.—American and German manufacturers, and Richard Johnson & Nephew, Manchester.
Polishing Paste.—Needham's (Joseph Pickering & Son, Sheffield).
Gas Engines.—Crossley Brothers, Limited, Manchester.
Agricultural Implements.—Some colonial made, the remainder mostly American, taken on the whole.

The Taylor & Wilson Company, Norfolk, Va., were incorporated under the State laws of Virginia a few months since. They are jobbers of Iron and Steel, handling especially blacksmith and coach makers' supplies. The territory covered includes the States of Delaware, North Carolina and Virginia. R. Calvert Taylor is president and treasurer; Edwin G. Lee, vice-president and secretary, and S. H. Wilson, general manager.

MISCELLANEOUS NOTE.

Rice's Adamant Cement.

U. S. Gutta Percha Paint Company, Providence, R. I., manufacture Rice's Adamant Cement, a metallic compound in dry, powdered form, ground very fine, which, it is stated, when mixed with water to a consistency of thick paste and allowed to dry a few hours, becomes as hard as iron, absolutely insoluble in oil or water, and proof against intense heat. It can be quickly and easily applied by the use of an ordinary putty knife to fill any imperfection or fracture, and when hardened it matches the metal in color and will not chip out. The cement is not only adapted to iron founders' and machinists' uses, but is also referred to as invaluable for water, steam or gas pipe fitting, boilers, caissons, tanks, cylinders, as a butt or rivet cement, and for the hulls of iron or steel vessels. The cement is put up in 10, 15 and 50 pound cans; also in sample cans containing 5 pounds.

Double Barrel Hammerless Gun No. 370.

The accompanying cut represents a double barrel hammerless gun put on the market by the J. Stevens Arms & Tool Company, Chicopee Falls, Mass. The barrel is of



Double Barrel Hammerless Gun No. 370.

special Damascus steel, choke bored for nitro powder, with extension rib matted. The frame is drop forged and the breech is reinforced. It has a top snap, treble bolt, automatic safety, extra long frame, all parts drop forged. The stock is of varnished walnut, finely finished, with pistol grip, checked and capped. The fore-arm is also checked. The gun is adapted to any standard make of shell, loaded with either black or smokeless powders. It is made in 12 gauge, 28, 30 and 32 inch barrel; also in 16 gauge, 28 and 30 inch barrel, weighing about $7\frac{1}{4}$ to $8\frac{1}{2}$ pounds. The company make another gun, No. 350, similar in every particular except that the barrel is made of special smokeless steel.

Reliance Ball Bearing Door Hanger.

The Reliance Ball Bearing Hanger Company, 1 Madison avenue, New York, are manufacturing the hanger

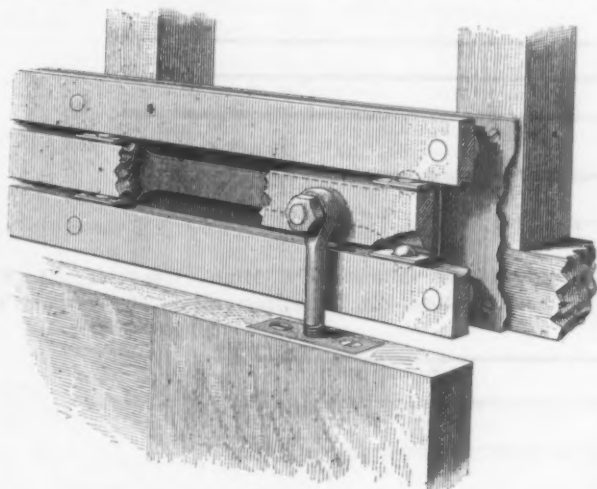


Fig. 1.—Reliance Ball Bearing Door Hanger.

herewith illustrated, the form of which embodies features which adapt it to use in connection with sliding doors

of various kinds. All parts of the hanger are made of machine steel, and the balls of hardened steel. In Fig. 1 a broken view of the hanger is shown. The races in which the balls move are of such profile as to reduce friction to a minimum, and the slightest touch, it is pointed out, will open or close an ordinary sliding door, whether it be of wood or iron. Fig. 1 shows the manner in which

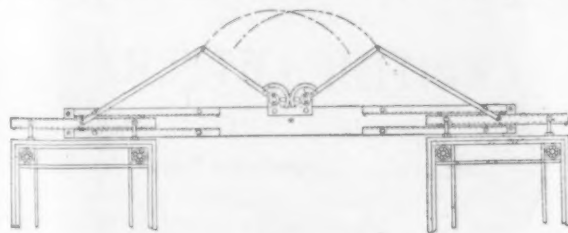


Fig. 2.—Arrangement for Opening or Closing Both Doors at One Operation.

the hanger is attached for use in connection with sliding doors in a dwelling, for example; also the relative position of the ball bearings. In case of double doors hung so as to slide in opposite directions and arranged so that the operator can open both doors at the same time, the quadrant gear mechanism shown in Fig. 2 is employed,

making use of two single hangers connected by levers or arms, pressure upon one door acting upon the other with equal force. Still another combination is that shown in Fig. 3, where the walking beam mechanism is employed in connection with double doors. Where there is insufficient head room for the combinations indicated in Figs.

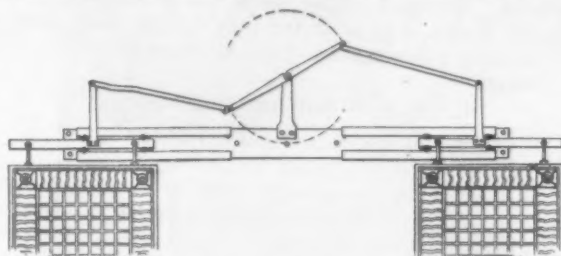


Fig. 3.—Another Combination for Same Purpose.

2 and 3 the rack and gear mechanism is employed, as shown in Fig. 4. The latter device is particularly applicable for use where the head room averages from 6 to 10 inches, but can be used where conditions differ from those mentioned. The same principle applies in connection with all the applications here illustrated, showing

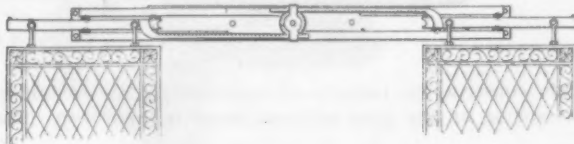


Fig. 4.—The Rack and Gear Mechanism.

that the hanger is adapted for all conceivable places where sliding doors, either single or double, are required. The hanger may also be used in connection with elevator doors and wherever a practically noiseless, easy running action is desired. The hanger is referred to as practically noiseless, with easy running action, and as being made of high grade material, combined with care in its manufacture.

New Idea Double Acting Floor Spring Hinge.

The double acting floor spring hinge illustrated in Fig. 1 is offered by the Stover Mfg. Company, Freeport, Ill.

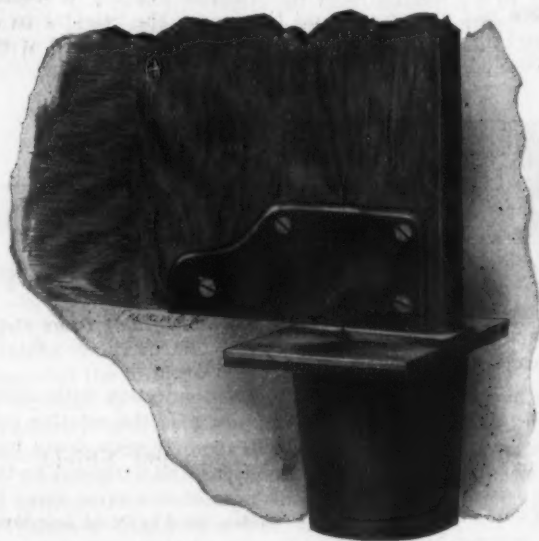


Fig. 1.—New Idea Double Acting Floor Spring Hinge.

Easy access to the spring is had by removing the steel plate on top of the hinge, and, by inserting the adjusting

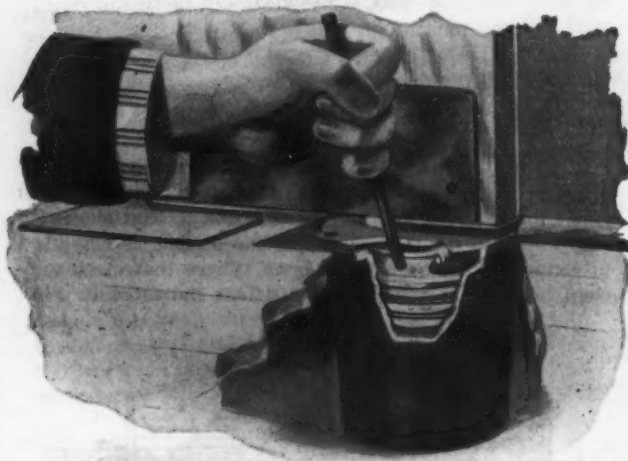


Fig. 2.—Regulating Tension of Spring.

pin in the hole in the collar, as shown in Fig. 2, the tension of the spring may be increased or decreased at will.

Mayhew's Reamer and Riffler.

Among the new tools recently put on the market by H. H. Mayhew Company, Shelburne Falls, Mass., are those shown in the accompanying cuts. In Fig. 1 is il-



Fig. 1.—Five-Sided Hand Reamer.

lustrated a five-sided hand reamer, with the blade tempered for hard usage. The riffler shown in Fig. 2 is designed as a quick cutting tool for broaching out irregular shapes, such as keyholes, mortises, &c., having a continuous spiral cutting edge. The manufacturers state that it will cut much faster than any file. The tool is made with round and tapered shanks. Sizes $\frac{1}{4}$ inch and un-



Fig. 2.—Riffler.

der have a straight, even spiral cut, while those 9-32 inch and over have an increase twist, and cut faster and do not clog.

New Jointed Rods.

Among the new rods put on the market by Clark-Horocks Company, Utica, N. Y., are those shown in the accompanying cuts. The rod illustrated in Fig. 1 is a hand made lancewood fly rod, made of best stock and guaranteed by the makers. The cedar taper above the grasp is alluded to as adding to the beauty and hang of the rod. All mountings are German silver. The ferrules are tapered on the wood and wound over with the silk. The rod is 9 to 10 feet in length, weighs from $5\frac{1}{2}$ to 7 ounces, and is put up in a new hand made, compact wood form and canvas bag. In Fig. 2 is shown a three-piece split bamboo casting rod, $4\frac{1}{2}$ to $6\frac{1}{2}$ feet long, with large casting guides, nickel mountings, with reel seat above the hand. It is extra wound in red silk, with cluster wind on the butt, and has a cork grasp. The rod is put up in a cloth partition bag.

THE regular quarterly meeting of the Board of Directors of the Retail Hardware Dealers' Mutual Fire Insurance Company of Minnesota was held on Thursday, May 20. Besides the usual business coming before the directors, the following officers were elected for the ensuing year: Charles F. Ladner, St. Cloud, Minn., president; Julius Schmidt, Wabasha, Minn., vice-president;



Fig. 1.—Hand Made Lancewood Rod No. 8364.

This construction permits of regulating the tension of the spring at any time without removing the door. The

Henry Hauser, Minneapolis, Minn., treasurer; M. S. Mathews, Minneapolis, Minn., secretary. The secretary's

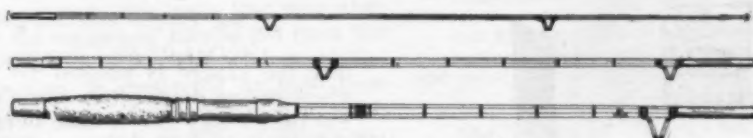


Fig. 2.—Split Bamboo Casting Rod No. 817.

hinge is made in iron and bronze metal for four thicknesses of doors and in a variety of finishes.

report showed the company to be in a most flourishing condition.

Machine Divided Tempered Steel Rules.

The Lufkin Rule Company, Saginaw, Mich., New York branch in charge of H. G. Hollis, 280 Broadway, have appreciably increased their line by the addition of a number of new articles, among which are the machine divided steel rules here illustrated. Fig. 1 shows a tem-

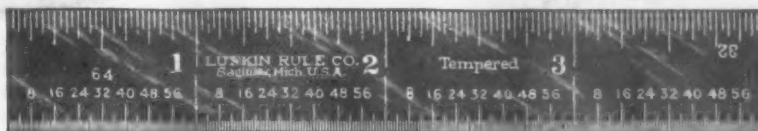


Fig. 1.—Tempered Steel Rule with Readable Graduations.

pered rule made in 11 lengths, from 1 to 48 inches, inclusive. An interesting feature of this style of graduation is the easily read method of indicating the necessarily fine lines of the sixty-fourths, so that a measurement can be accurately determined at a glance. There are three different kinds of graduation in this form of rule. No. 2204, No. 4 graduations, has on one side eighths and sixteenths, the other side giving thirty-seconds and sixty-fourths. The ends on all rules 2 to 12 inches, inclusive, are graduated to thirty-seconds, as in Fig. 2. No. 2207, No. 7 graduations, has sixteenths and thirty-seconds on one side and sixty-fourths and one-hundredths on the reverse. The third style, No. 3227, is graduated on one side, one edge, first inch sixty-fourths, second inch thirty-seconds and remainder sixteenths. The other edge, first inch in one-hundredths,

held firmly in its seat by the pressure of the compression spring. The claim for this can is that the flow of oil is regulated absolutely and can be gauged to a single drop, and does not leave a trail of oil from bearing to bearing, which not only wastes oil but leaves the machine in an unsightly condition. The oilers are manufactured of tin, brass and copper in several sizes, with bent and straight

spouts of various lengths. Theodore Geissmann & Co., Chicago, Ill., are sales agents for the West.

One-Part Diamond Expansion Shield.

The New Jersey Foundry & Machine Company, 9 Murray street, New York, are offering the new one-part Diamond expansion shield which they manufacture, shown in connection with a lock in the accompanying illustration. It is remarked that for years the impression has been that expansion bolts were only intended for use in masonry, but it is stated by the manufacturers that the shield illustrated will hold equally well in wood and will not work loose. It is designed for fastening down

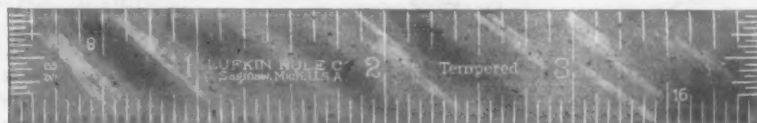
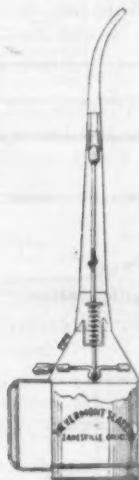


Fig. 2.—An Example of Reverse Side with End Graduations.

second inch fiftieths, the remainder tenths. On the other side one edge is in millimeters, the other edge half millimeters. The width of these rules is about $\frac{1}{2}$ inch for 1, 2 and 3 inch lengths; $\frac{3}{8}$ inch in 4-inch; $\frac{1}{4}$, 6-inch; $\frac{3}{8}$, 9-inch; 1 inch for 12-inch and $1\frac{1}{4}$ for the 18, 24, 36 and 48 inch sizes, all about 1-20 inch thick. Every rule is wrapped in oil paper and put up separately in envelopes, with printed description, thus enabling the dealer to keep the article fresh and salable until it reaches the purchaser.

Vermont Safety Oil Can.

The metal working department of the Vermont Slate Company, Zanesville, Ohio, are placing on the market



Vermont Safety Oil Can.

a new oil can, as illustrated herewith. Pressure of the thumb on the trigger just above the handle of the can depresses the plunger of the valve, which is otherwise

chairs and desks in schoolrooms, stools in stores, opera chairs, locks on doors of passenger coaches, &c., where constant use tends to loosen the screws. With the shield it is only necessary to bore a hole with an ordinary bit, insert the shield and run in the screw the same as in



One-Part Diamond Expansion Shield.

wood. The shield is made with four prongs, to insure a uniform grip in all directions, and is made in standard sizes from $\frac{1}{4}$ to 5-16 inch diameter, to fit wood screws from No. 5 to No. 18, inclusive. Any kind, make or length of wood screw can be used. The company carry all sizes of the one-part shield in stock, and also of the Diamond two-part expansion shield up to 2 inches diameter.

Explosive Popgun and Pistol.

O. B. Fish, Hudson and Harrison streets, New York, has just put on the market, as here shown, two seasonable toys for the amusement of children, whose patriotism is preferably expressed by noise. Fig. 1 illustrates the explosive pistol, 9 inches long, with heavy tin barrel

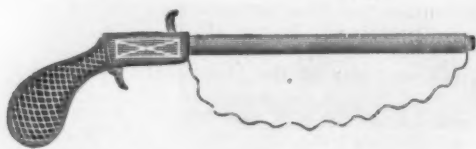


Fig. 1.—Explosive Pistol.

5½ inches in length. The pistol, with substantial cast iron handle, weighs 5 ounces. The explosive popgun, Fig. 2, is 20 inches long, with 9½-inch steel barrel, and weighs 14 ounces. It has a nicely finished stock of dark oak. Both gun and pistol are finished in aluminum bronze and used with corks attached or detached, with

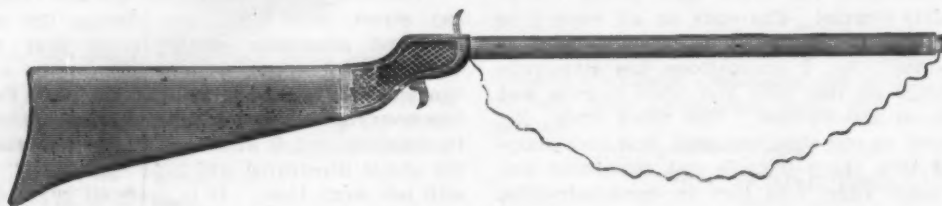
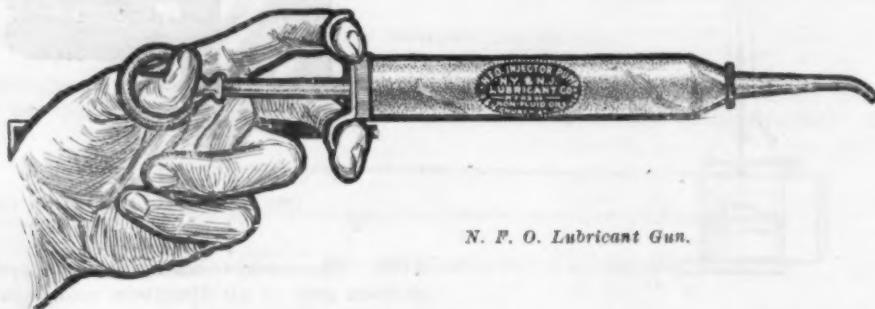


Fig. 2.—Explosive Popgun.

or without paper caps. The cork detached from string used in connection with pistol can be driven 30 feet without cap, 40 feet with one cap and 50 feet with two caps. Similarly the gun will shoot a detached cork 40, 55 and 70 feet, in both instances there being a loud report. As both pistol and gun can be used in or out of doors, and with or without a cork, a good all round toy is provided.

N. F. O. Lubricant Gun.

The New York & New Jersey Lubricant Company, 14-16 Church street, New York, have recently put on the market the N. F. O. lubricant gun, here shown. This implement is intended for conveniently and quickly oiling automobile bearings with one hand, some of which can be reached by the driver even while the car is running, if necessary. It can also be used for lubricating any of the multitudinous bearing surfaces, for instance, line shafting, motor boats, engine bearings, motors and general machinery, as well as for filling spindle cups in textile machinery, gear boxes of elevators, &c. The gun is very substantially made of heavy gauge 1½-inch seamless brass tubing, which enables it to successfully withstand hard usage in tool kits. From end to end, closed, the gun is 12½ inches long, has a stout piston rod 5-16 inch diameter, with 1 7-16-inch ring of cast brass. The cylin-



N. F. O. Lubricant Gun.

der is of one piece of tubing, drawn down at the nozzle end, to which a strong spout is screwed. The double finger piece riveted to end screw cap permits the user, when the gun is charged, to squirt with considerable

force either fluid, non-fluid or grease lubricants into the bearings directly, thus greatly economizing good material and reaching many bearings not otherwise accessible without soiling one's clothes or person. The gun, like an ordinary syringe, is filled by drawing out the piston, which is made of good cork compressed between the two steel disks and held in place by a hexagon nut, there being a spiral steel spring ¾ inch long between piston and tube cap. The construction is strong and workmanlike throughout. All the guns are made of brass, but can be furnished in natural color, antique bronze and gun metal finishes. Oils or greases of too heavy specific gravity to be drawn through the taper spout by suction can be easily introduced into the cylinder by removing the spout and drawing the material through the larger or ½-inch opening in the regular way. The guns are put up in strong cardboard boxes singly.

United States Mail Bank.

O. B. Fish, Hudson and Harrison streets, New York, is manufacturing the United States mail bank here illus-

trated. It is made of cast iron, attractively finished with aluminum bronze, and is a *fac-simile* of a United States letter box, with raised red letters. The dimen-



U. S. Mail Bank.

sions are 6½ x 4¼ x 2¾ inches and it weighs 3¼ pounds. It is of fine appearance, and has a combination safe lock by means of which a small opening is exposed in the

back through which to remove coins, it being impossible to get the contents out otherwise or through the slot. The bank is unlockable only through a knowledge of the combination on which it is locked.

Current Hardware Prices.

General Goods.—In the following quotations General Goods—that is, those which are made by more than one manufacturer, are printed in *Italics*, and the prices named, unless otherwise stated, represent those current in the market as obtainable by the fair retail Hardware trade, whether from manufacturers or jobbers. Very small orders and broken packages often command higher prices, while lower prices are frequently given to larger buyers.

Special Goods.—Quotations printed in the ordinary type (Roman) relate to goods of particular manufacturers, who are responsible for their correctness. They usually represent the prices to the small trade, lower prices being obtainable by the fair retail trade, from manufacturers or jobbers.

Range of Prices.—A range of prices is indicated by means of the symbol @. Thus 33 $\frac{1}{2}$ @ 33 $\frac{1}{2}$ & 10% signifies that the

price of the goods in question ranges from 33 $\frac{1}{2}$ per cent. discount to 33 $\frac{1}{2}$ and 10 per cent. discount.

Names of Manufacturers.—For the names and addresses of manufacturers see the advertising columns and also THE IRON AGE DIRECTORY, issued May, 1904, which gives a classified list of the products of our advertisers and thus serves as a DIRECTORY of the Iron, Hardware and Machinery trades.

Standard Lists.—A new edition of "Standard Hardware Lists" has been issued and contains the list prices of many leading goods.

Additions and Corrections.—The trade are requested to suggest any improvements with a view to rendering these quotations as correct and as useful as possible to Retail Hardware Merchants.

Abrasives—

Adamite in Carloads: Φ ton \$90@100
Crystal Φ ton \$130@140
See also Emery.

Adjusters, Blind—

Domestic, Φ doz. \$3.00.....83 $\frac{1}{2}$
North's.....10%
Zimmerman's—See Fasteners, Blind.

Window Stop—

Iron's Patent.....35%
Taplin's Perfection.....35%

Ammunition—See Caps, Cartridges, Shells, &c.

Anvils—American—

Armand Hammer, Wrought Φ doz. \$28@29 $\frac{1}{2}$
Buel Patent, Trenton, Φ doz. \$74@75 $\frac{1}{2}$
Eagle Anvil, Φ doz. \$74@75 $\frac{1}{2}$
Hay-Budden, Wrought.....\$9@9 $\frac{1}{2}$
Horseshoe brand, Wrought.....\$9@9 $\frac{1}{2}$

Imported—

Peter Wright & Sons, Φ doz. \$10 $\frac{1}{2}$

Anvil, Vise and Drill—

Millers Falls Co., \$18.00.....15&10%

Apple Parers—See Parers, Apple, &c.

Aprons, Blacksmiths—

Hull Bros. Co.....\$4@5 $\frac{1}{2}$
Livingston Nail Co.....39 $\frac{1}{2}$

Augers and Bits—

Com. Double Spur.....75@75 $\frac{1}{2}$
Boring Machine Augers.....56 $\frac{1}{2}$ @70%
Car Bits, 12-in. twist.....60@60 $\frac{1}{2}$
Jennings' Pattern.....50@60 $\frac{1}{2}$
Ford's Auger and Car Bits.....40@5 $\frac{1}{2}$
Foster Pat. Auger Bits.....25%
C. E. Jennings & Co.:
No. 10 ext. lip. R. Jennings' Hat 25&10%
No. 30, R. Jennings' List, 40&7 $\frac{1}{2}$ @10%
Russell Jennings.....25&10 $\frac{1}{2}$
L'Hommedieu Car Bits.....15&10%
Mayhew's Counter Sink Bits.....45%
Millers Falls.....30&10 $\frac{1}{2}$
Ohio Tool Co.'s Bailey Auger and Car Bits.....40&10%
Pugh's Black.....20%
Pugh's Jennings' Pattern.....35%
Snell's Auger Bits.....60%
Snell's Bell Hangers' Bits.....50&10%
Snell's Car Bits, 12-in. twist.....60%
Wright's Jennings Bits (R. Jennings' List).....50%

Bit Stock Drills—

See Drills, Twist.

Expansive Bits—

Clark's small, \$15; large, \$20.....50&10%
Clark's Pattern, No. 1, Φ doz., \$20;
No. 2, \$18.....50&10%
Ford's, Clark's & Co.....30&10%
C. E. Jennings & Co., Steer's Pat., 25&10%
Swan's.....60%

Gimlet Bits—

Common Double Cut, Φ doz. \$3.00@3.25

German Pattern..... Φ doz. \$4.50@4.75

Hollow Augers—

Bonney Pattern, per doz. \$10.00@11.00
Ames.....25&10%
New Patent.....25&10%
Universal.....25&10%
Wood's Universal.....25%

Ship Augers and Bits—

Ford's.....40%
C. E. Jennings & Co.:
L'Hommedieu's.....15&10%
Watrous.....33 $\frac{1}{2}$ @10%
Ohio Tool Co.'s.....40%
Snell's.....40%

Awl Hafts, See Hafts, Awl.

Awls—

Brad Awls:
Handled..... Φ doz. \$2.75@3.00
Unhandled, Shouldered, Φ doz. \$3.00@3.25
Unhandled, Patent..... Φ doz. \$3.00@3.25
Peg Awls:
Unhandled, Patent..... Φ doz. \$1.00@1.25
Unhandled, Shouldered, Φ doz. \$1.00@1.25
Scratch Awls:
Handled, Common..... Φ doz. \$3.50@4.00
Handled, Socket..... Φ doz. \$11.50@12.00
Hurwood.....40%

Awl and Tool Sets—See Sets, Awl and Tool.

Axes—

First Quality.....\$3.50@4.00
Second Quality.....\$4.75@5.25

Axle Grease—See Grease, Axle

Axles—

Concord, Loose Collar.....50@54 $\frac{1}{2}$
Concord, Solid Collar.....50@54 $\frac{1}{2}$
No. 1 Common.....44 $\frac{1}{2}$ @50 $\frac{1}{2}$
No. 1 $\frac{1}{2}$ Com. New Style.....44 $\frac{1}{2}$ @50 $\frac{1}{2}$
No. 2 Solid Collar.....44 $\frac{1}{2}$ @54 $\frac{1}{2}$
Nos. 7, 8, 11 and 12.....60@50@60 $\frac{1}{2}$
Nos. 13 to 14.....60@50@60 $\frac{1}{2}$
Nos. 15 to 18.....60@50@70%
Nos. 19 to 22.....60@50@70%

Boxes, Axle—

Common and Concord, not turned.....lb. 4 $\frac{1}{2}$ @4 $\frac{1}{2}$

Common and Concord, turned.....lb. 5@5 $\frac{1}{2}$

Half Patent.....lb. 9@9 $\frac{1}{2}$

Bait—

Reudry:
A Bait.....30%
B Bait.....25%
Competitor Bait.....30&5%

Balances—

Caldwell new list.....50%
Fullman's.....60%

Spring—

Spring Balances.....60@60 $\frac{1}{2}$

Chatillon's:
Straight Balances.....40&10%
Circular Balances.....50%
Large Dial.....30%
Pelouze.....50%

Barb Wire—See Wire, Barb.

Bars—

Steel Crowbars, 10 to 40 lb., per lb. 3@3 $\frac{1}{2}$

Towel—

No. 10 Ideal, Nickel Plated..... Φ gro. \$3.50

Beams, Scale—

Scale Beam, List Jan. 12, '85, 100&10%

Chatillon's No. 1.....30%
Chatillon's No. 2.....40%

Beaters—

Holt-Lyon Co.:
No. 12 Wire Coppered Φ doz. \$0.85;
Tinned.....\$1.00

No. 14 Wire Coppered Φ doz. \$1.10;
Tinned.....\$1.20

No. 16 Wire Galvanized..... Φ doz. \$1.75

Western W. G. Co.:
No. 1 Electric..... Φ gro. \$7.80

No. 2 Buffalo..... Φ gro. \$9.00

No. 3 Perfection Dust..... Φ gro. \$8.00

Egg—

Holt-Lyon Co.:
Holt, No. A, Japanned..... Φ doz. \$1.20

Holt, No. 1, Tinned..... Φ doz. \$1.50

Holt, No. B, Japanned..... Φ doz. \$2.00

Holt, No. 2, Tinned..... Φ doz. \$2.25

Lyon, No. 3, Japanned..... Φ doz. \$1.25

Lyon, No. 4, Japanned..... Φ doz. \$1.50

Lightning Chain, Φ gro.....\$15.00

National Mfg. Co.:
No. 1 Dover, Family size.....\$7.00

No. 2 Dover, Hotel size.....14.00

Taplin Mfg. Co.:
No. 60 Improved Dover.....\$6.00

No. 75 Improved Dover.....\$6.50

No. 100 Improved Dover.....\$7.00

No. 103 Improved Dover, Tin'd.....\$8.50

No. 150 Improved Dover, Hotel.....\$15.00

No. 152 Imp'd Dover, Hotel, Tin'd.....\$17.00

No. 200 Imp'd Dover Tumbler.....\$8.50

No. 300 Imp'd Dover Mammoth.....\$9.50

Φ doz.....\$35.00

Western W. G. Co., Buffalo.....\$7.00

Wonder (S. S. & Co.)..... Φ gro. net, \$8.00

Bellows—

Blacksmith, Standard List, 75@75 $\frac{1}{2}$ &5%

Blacksmiths'—

Inch.....30 32 34 36 38 40

Each.....\$3.50 3.75 4.25 4.80 5.35 6.15

Extra Length:
Each.....\$4.00 4.55 5.10 5.60 6.10 7.30

Molders—

Inch.....10 12 14

Doz.....\$3.50 10.00 13.00

Hand—

Inch.....6 7 8 9 10

Doz.....\$5.25 6.50 8.00 9.50 11.00

Bells—

Ordinary goods.....75@5@75@10%

High grade.....70@10@70@10%

Jersey.....75@10%

Texas Star.....50%

Door—

Abbe's Gong.....45%

Barton Gong.....55%

Home, R. & E. Mfg. Co.'s.....55&10%

Lowe and Pull, Sargent's.....60&10&10%

Yankee Gong.....35%

Hand—

Hand Bells, Polished, Brass.....30&@60&1%

White Metal—

Nickel Plated.....60%
Swiss.....30@50@55%
Cone's Globe Hand Bells.....80@80 $\frac{1}{2}$ @10%
Silver Chime.....33 $\frac{1}{2}$ @33 $\frac{1}{2}$ @10%

Miscellaneous—

Farm Bells.....lb. 2 $\frac{1}{4}$ @2 $\frac{1}{2}$

Steel Alloy Church and School.....50@10@60@5%

American Tube & Stamp'g Co. Gongs.....75%

Table Call Bells.....50@50 $\frac{1}{2}$ @10%

Trip Gong Bells.....55&10@60%

Belt—

Agricultural (Low Grade).....75@75 $\frac{1}{2}$ @5%

Common Standard.....70@70 $\frac{1}{2}$ @10%

Standard.....65@70%

High Grade.....80@50@10%

Boston Belting Co.:
Seamless Stitched Imperial.....45&5%

Boston.....50&5%

Niagara.....60&5%

Leather—

Extra Heavy, Short Lap.....60@60 $\frac{1}{2}$ @5%

Regular Short Lap 60&10@60&10%

Standard.....70@70 $\frac{1}{2}$ @5%

Light Standard.....70@70 $\frac{1}{2}$ @10%

Out Leather Lacing.....60&10%

Leather Lacing Sides, per sq. ft. 1.50

Bench Stops—See Stops, Bench

Benders and Upsetters—

Tire—

Detroit Perfected Tire Bender.....40%

Green River Tire Benders and Upsetters.....30%

Detroit Stoddard's Lightning Tire Upsetters, No. 1, \$4.25; No. 2, \$7.25; No. 3, \$10.50; No. 4, \$16.35; No. 5, \$20.50.

Bicycle Goods—

John S. Long's Son's 1903 list:
Chain.....50%

Parts.....50%

Spokes.....50%

Spokes.....50%

Spokes.....50%

Spokes.....50%

Spokes.....50%

Spokes.....50%

Spokes.....50%

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Spokes.....50%

Norway Iron—

American Screw Company.....80@80 $\frac{1}{2}$ @10%

Norway Phila., list Oct. 16, '84.....80%

Eagle Phila., list Oct. 16, '84.....82 $\frac{1}{2}$ %

Bay State, list Dec. 28, '89.....72 $\frac{1}{2}$ %

Franklin Moore Co.:
Norway Phila., list Oct. 16, '84.....80%

Eagle Phila., list Oct. 16, '84.....82 $\frac{1}{2}$ %

Eclipse, list Dec. 28, '89.....72 $\frac{1}{2}$ %

Russell, Burdell & Ward Bolt & Nut Co.
Empire, list Dec. 28, '89.....72 $\frac{1}{2}$ %

Norway Phila., list Oct. '84.....80%

Opson Nut Co.:
Tire Bolts.....72 $\frac{1}{2}$ %

Borers, Tap—

Borers Tap, Ring, with Handle:
Inch.....1 $\frac{1}{4}$ 1 $\frac{1}{2}$ 1 $\frac{3}{4}$ 2

Can Openers—See Openers, Can

Cans, Milk—	
Illinois Pattern, \$1.50	2.00 2.25 each.
Iowa Pattern,	2.35 2.50 each.
New York Pattern,	2.40 2.75 each.
Baltimore Pattern,	1.50 2.00 each.

Cans, Oil—	
Buffalo Family Oil Cans:	
3 gal.	10 gal.
\$48.00 64.20	129.60 gro., net

Caps—Peruccion—	
Eley's E. B.	80c
G. D.	per M \$4.00
F. J.	per M \$4.50
G. E.	per M \$5.00
Musket,	per M \$6.00

Primers—	
Berdan Primers, \$2.00 per M.	80c
B. L. Caps (Sturtevant Shell)	
\$2.00 per M.	80c
All other primers per M.	\$1.50

Cartridges—	
Blank Cartridges:	
38 C. F., \$5.50	10c
38 C. F., \$7.00	10c
21 cal. Rim, \$1.50	10c
32 cal. Rim, \$2.75	10c
B. B. Caps, Con. Ball Sg'd.	\$1.90
B. B. Caps, Round Ball.	\$1.40
Central Fire	25c
Target and Sporting Rifle	15c
Primed Shells and Bullets	15c
Rim Fire Sporting	50c
Rim Fire Military	15c

Cases, Show—	
Sun, No. 102, Silent Salesman, 6 ft.,	\$25.00

Castors—	
Bed,	70c to 70c
Plate,	60c to 60c
Philadelphia,	75c to 75c
Boss,	70c to 70c
Ross Anti-Bearing,	75c to 75c
Ge u (Koller Bearing),	75c to 75c
Martin's Patent (Phoenix),	45c
Smith & Hemenway Co.,	35c
Standard Ball Bearing,	45c
Tucker's Patent low list,	30c
Yale (Double Wheel) low list,	45c

Cattle Leaders—	
See Leaders, Cattle.	

Chain, Coil—	
American Coil, Jobbers' Shipments:	
3-16 3/4 7-16 3/4 9-16	9-16
5-16 5-16 7-16 5-16 9-16	3-16
3-8 3-8 5-8 3-8 7-8	1-16 to 1-16
3-8 3-8 5-8 3-8 7-8	1-16 to 1-16
German Coil,	60c to 60c

Halters and Ties—	
Halter Chains,	60c to 60c
German Pattern Halter Chains,	1st
July 24, '97,	60c to 60c
Cow Ties,	60c to 60c

Trace, Wagon, &c.—	
Traces, Western Standard, 100 pair	6-5, Straight, with ring, \$23.50
6-5, 6-5, Straight, with ring,	\$21.50
6-5, 8-2, Straight, with ring,	\$25.00
6-5, 10-2, Straight, with ring,	\$32.00
Add 2c per pair for Hooks	
Twist Traces 2c per pair higher than	
Straight Link.	

Trace, Wagon and Fancy Chains.	
60c to 60c	10c to 10c

Miscellaneous—	
Jack Chain, list July 10, '93:	
Iron,	60c to 60c
Brass,	60c to 60c
Safety Chain,	75c to 75c
Gal. Pump Chain,	1b 4 1/4 to 4 1/4
Cover Mfg. Co.,	40c to 40c

Cover Mfg. Works:	
Breast,	70c
Halter,	70c
Hold Back,	70c
Rela,	70c

Oneda Community:	
Am. C. Oil and Halters,	40c to 40c
Am. Cow Ties,	45c to 45c
Eureka Coll and Halters,	45c to 45c
Niagara Coll and Halters,	45c to 45c
Niagara Cow Ties,	45c to 45c
Niagara Wire Dog Chains,	45c to 45c

Wire Goods Co.:	
Dog Chain,	70c to 70c
Universal Dbl-Jointed Chain,	50c

Chalk—(From Jobbers.)	
Carpenters' Blue,	gro. 40c
Carpenters' Red,	gro. 35c
Carpenters' White,	gro. 30c

Checks, Door—	
Bardley's,	45c
Columbia,	60c to 60c
Kellogg,	60c to 60c

Chests, Tool—	
American Tool Chest Co.:	
Boys' Chests, with Tools,	35c
Youths' Chests, with Tools,	40c
Gentlemen's Chests, with Tools,	45c
Farmers' Carpenters', etc., Chests,	50c
Machinists' and Fitters' Chests,	55c
Empty,	40c
C. E. Jennings & Co.'s Machinists' Tool	
Chests,	35c to 35c

Chisels—	
Socket Framing and Firmer	
Standard List,	70c to 70c
Irish Bros,	30c
Charles Rusk,	30c
No. 10,	60c to 60c
C. E. Jennings & Co. Socket Framing	
No. 15,	60c to 60c
Ohio Tool Co.'s,	7c
Swan,	70c
L. & J. White,	30c to 30c

Tanged—	
Tanged Firmers,	40c to 40c
Buck Bros,	30c
Charles Duck,	30c
C. E. Jennings & Co. Nos. 19,	15c
L. & J. White, Tanged,	15c

Cold—	
Cold Chisels, good quality, lb. 13c	15c
Cold Chisels, fair quality, lb. 11c	12c
Cold Chisels, ordinary, lb. 9c	10c

Chucks—	
Beach Pat., each \$3.00,	35c
Pratt's Positive Drive,	25c
Empire,	25c
Blacksmiths',	25c

Skinner Patent Chucks:	
Independent Lathe Chucks,	50c
Universal,	50c
Combination,	50c
Drill Chucks, New Model,	40c
Drill Chucks, Standard,	40c
Drill Chucks, Skinner Patent, 0, 1, 2, 4, 5, 6, 7, 8,	40c
Drill Chucks, Positive Drive,	30c
Planer Chucks,	25c
Face Plate Jaws,	40c

Standard Tool Co.:	
Improved Drill Chuck,	45c
Union Mfg. Co.,	50c
Combination,	50c
Czar Drill,	35c
Combination Geared Scroll,	40c
Geared Scroll,	40c
Independent,	40c
Independent Steel,	40c
Union Drill,	40c
Universal,	50c
Independent Iron Face Plate Jaws,	40c
Independent Steel Face Plate Jaws,	40c

Westcott Patent Chucks:	
Lathe Chucks,	50c
Little Giant Auxiliary Drill,	45c
Little Giant Double Grip Drill,	45c
Little Giant Drill, Improved,	45c
Oneda Drill,	45c
Scroll Combination Lathe,	45c

Clamps—	
Adjustable, Hammers',	20c to 20c
Cabinet, Sargent's,	50c to 50c
Carriage Makers', P., S. & W. Co.,	50c
Carriage Makers' Sargent's,	50c
Best, Parallel,	33c to 33c
Linemans' Utica Drop Forge & Tool Co.,	40c
Sw Clamps, see Vices, Saw Files.	

Cleaners, Drain—	
Iwan's Champion, Adjustable,	55c
Iwan's Champion, Stationary,	40c

Sidewalk—	
Star Socket, All Steel,	40c
Star Shank, All Steel,	40c
W. & C. Snaar, All Steel,	7 1/2 in., \$5.00; 8 in., \$5.25.

Cleavers, Butchers'—	
Poster Bros,	30c
New Haven Edge Tool Co.,	40c
Fayette R. Plumb,	33c to 33c
L. & J. White,	30c

Clippers—	
Chicago Flexible Shaft Company:	
95 Chicago Horse,	\$8.75
1002 Chicago Horse,	\$10.75
20th Century Horse, each,	\$15.00
Lightning Belt,	\$15.00
Chicago Belt,	\$20.00
Stewart's Patent Sheep,	\$18.50

Finger Nail Clippers—	
Smith & Hemenway Co.,	doz. net \$2.00

Clips, Axle—	
Eagle 5-12 and 3/4 inch,	75c to 75c
Norway, 5-16 and 3/4 inch,	60c to 60c

Cloth and Netting, Wire—	
See Wire, &c.	

Cocks, Brass—	
Hardware list:	
Compression, Plain Bibbs, Globe,	
Kerosene, Racking, &c., Cocks,	
70c to 70c	

Coffee Mills—See Mills, Coffee.	
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Collars, Dog—	
Brass, Walter B. Stevens & Son's list, 40c	
Embossed, Gift, Walter B. Stevens &	
Son's list,	30c to 30c
Leather, Walter B. Stevens & Son's list, 40c	

Combs, Curry—	
Metal Stamping Co.,	30c to 30c

Mane and Tail—	
Cover's Saddlery Works,	60c to 60c

Compasses, Dividers, &c.—	
Ordinary Goods,	75c to 75c
Bemis & Call Haw. & Tool Co.,	75c to 75c

Dividers,	
Calipers, Double,	65c
Calipers, Inside or Outside,	65c
Calipers, Wing,	60c
Compasses,	50c

Compressors, Corn hock—	
J. B. Hughes' per doz.,	\$2.50

Conductor Pipe, Galva—	
L. C. L. to Dealers:	
Territory,	Not noted.
A. Eastern, 75c 7/16,	75c 7/16
B. Eastern, 75c 1/16 to 2 1/16,	75c 1/16
Central,	75c
Southern,	70c to 70c
S. Western,	70c 7/16

Terms, 60 days, 25 cash, 10 days. Factory	
shipments generally delivered.	
See also Eave Troughs.	

Coolers, Water—	
Gal. each,	3 4 6 8
Labrador \$1.90 \$1.50 \$1.80 \$2.10 2.70	
Iceland, ea. \$1.80 \$2.10 2.40 \$3.00	
Gal.,	3 4 6 8
Galv. Lined Ea. \$1.85 \$2.00 \$2.2 \$2.90 \$3.90	

Galv. Lined side handles	
Gal.,	2 4 6 8
Each, \$1.95 \$2.15 \$2.40 \$3.20 \$4.15, 25c	

Coopers' Tools—	
See Tools, Coopers'.	

Cord—Sash—	
Braided, Drab,	lb. 35c
Braided, White, Com.,	lb. 25c to 25c
Cable Laid Italian, lb. A, 15c; B, 10c	
Common India,	lb. 10c to 10c
Cotton Sash Cord, Twisted,	20c to 20c
Patent Russia,	lb. 25c
Cable Laid Russia,	lb. 15c
India Hemp, Braided,	lb. 15c
India Hemp, Twisted,	lb. 12c to 12c
Patent India, Twisted,	lb. 12c to 12c

Anniston Cordage Co.: Braided Cotton.	
Old Glory, Nos. 7 to 12,	25c to 25c
Anniston, Nos. 7 to 12,	25c to 25c
Old Colony, Nos. 7 to 12,	25c to 25c
Anniston Drab, Nos. 7 to 12,	25c to 25c

Pearl Braided, cotton, No. 6 1/2, 24c;	
Nos. 7 to 12 25c.	
Eddystone Braided Cotton, No. 6 1/2, 27c	
Harmony Cable Laid Italian, No. 7 to 12	
0	

Peerless:	
Cable Laid Italian,	10c
Cable Laid Russian,	14c
Cable Laid India,	12c
Braided India,	18c

Samson, Nos. 7 to 12:	
Braided, Drab Cotton,	36c to 36c
Braided, Italian Hemp,	36c to 36c
Braided, Linen,	36c to 36c
Braided, White Cotton or Spot,	36c to 36c
Massachusetts, White,	36c to 36c
Massachusetts, Drab,	36c to 36c
Phoenix, White, No. 7 to 12,	24c
No. 6 cords, 1c extra.	

Silver Lake:	
A quality, Drab,	40c
A quality, White,	35c
B quality, Drab,	35c
B quality, White,	30c
Italian Hemp,	40c
Linen,	57c to 57c

Wire, Picture—	
List Oct., '00,	85c to 85c

Cradles—	
Grain,	10c to 10c

Crayons—	
White Round Crayons, gross, 5 1/2 doz	
Cases, 100 gro., \$4.00, at factory,	
D. M. Steward Mfg. Co.,	
Jumbo Crayons,	37c to 37c
Metall Workers' Crayons,	\$2.50
Soapstone Pencil, round, flat	
or square,	gr. \$1.50
Rolling Mill Crayons,	gr. \$2.50
Railroad Crayons (compo	
sition) gr. \$2.00.	

Zelicker's Lumber:	
Red, Blue, Green,	gr. \$6.50
See also Chalk.	

Crooks, Shepherds'—	
Fort Madison, Heavy,	gr. \$7.00
Fort Madison, Light,	gr. \$6.50

Crow Bars—See Bars, Crow.	
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Cultivators—	
Victor Garden,	50c

Cutlery, Table—	
International Silver Company:	
No. 12 Medium Knives, 18 1/2, 7 doz. \$3.50	
Star, Eagle, Rogers & Hamilton and	
Anchor,	7 doz. \$3.00
Wm. Rogers & Son,	7 doz. \$2.50
Simons L. & Geo. H. Rogers Company:	
12 doz. Medium Knives,	7 doz. \$3.00
No. 77 Medium Knives,	7 doz. \$2.50

Cutters—Glass—	
H. H. Mayhew Co.,	40c
Red Devil,	50c
Smith & Hemenway Co.,	70c
Woodward,	40c

Meat and Food—	
American,	30c
Nos. 1 2 3 4 5 6	
Each,	\$5 \$7 \$10 \$25 \$50 \$60
Enterprise,	30c to 30c
Nos. 305 310 312 320 322	
Each,	\$3 \$5 \$2.75 \$4.50 \$6
Dixon's, per doz.,	\$3.50 to 40c
Nos. 1 2 3 4 5 6	
\$14.00 \$17.00 \$19.00 \$30.00	
Ideal,	40c to 40c
Little Giant, per doz.,	\$5.00 to 40c
Nos. 305 310 312 320 322	
\$35.00 \$48.00 \$44.00 \$75.00 \$98.00	
N. E. Food Choppers,	40c
New Triumph No. 605, per doz., \$24.00	

Russwin Food No. 1, \$24.00; No. 2, \$27.00	
Sterling,	40c to 40c
No. 1,	\$2.00 each
No. 2,	\$2.50 each
Woodruff's, per doz.,	\$3.00 to 40c
Nos. 100 150	
Enterprise Beef Shavers,	\$15.00 \$18.00

Forks—

Base D. counts Aug. 1, 1893, list;

Hay, 3 tine.....	60¢10¢5¢
Boys' & Fish, 3 tine.....	50¢10¢5¢
Hay & Boys', 3 tine.....	60¢5¢
Hay & Boys', 4 tine.....	60¢5¢
Champion Hay.....	60¢5¢
Hay & Header, long 3 tine.....	6¢
Header, 4 tine.....	60¢
Barley, 4 & 5 tine, Steel.....	60¢20¢
Manure, 4 tine.....	60¢15¢20¢
Manure, 5 & 6 tine.....	60¢20¢
Spading.....	70¢20¢
Potato Digger, 6 tine.....	60¢10¢
Sugar Beet.....	40¢10¢
Coke & Coal.....	40¢10¢
Hay Mill & Street.....	60¢
Low Dig-Eay Potato.....	60¢10¢
Victor, Hay.....	60¢15¢20¢
Victor, Manure.....	60¢5¢
Victor, Header.....	60¢5¢
Champion, Hay.....	60¢5¢
Champion, Header.....	60¢5¢
Champion, Manure.....	60¢15¢20¢
Columbia, Hay.....	60¢20¢
Columbia, Manure.....	70¢
Columbia, Spading.....	70¢12¢
Hawkeye Wood, Barley.....	40¢
W. & C. Potato Digger.....	60¢12¢
Acme Hay.....	60¢10¢5¢
Acme Manure, 4 tine.....	60¢20¢70¢
Dakota Header.....	60¢15¢20¢
Jackson Steel Barley.....	60¢15¢20¢
Kansas Header.....	60¢5¢
W. & C. Favorite Wood Barley.....	40¢

Plated.—See Spoons.

Fountains, Stock—

Double Dewey.....	Per doz. \$13.00
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Frames—Saw—

White, Straight Bar, per doz.	75¢80¢
Red, Straight Bar, per doz.	\$1.00\$1.15
Red, Double Brace, per doz.	\$1.60\$1.50

Freezers Ice Cream—

Each.....	\$1.25 \$1.00 \$1.90 \$2.30 \$2.80
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Fruit and Jelly Presses—

See Presses, Fruit and Jelly.

Fry Pans—See Pans, Fry.

Fuse—

Per 1000 Feet.....	\$3.75
Hemp.....	3.90
Cotton.....	3.65
Waterproof Single Taped.....	4.40
Waterproof Double Taped.....	4.65
Waterproof Triple Taped.....	5.15

Gates, Molasses and Oil—

Stebbins' Pattern..... 80¢10¢50¢10¢65¢

Gauges—

Marking, Mortise, etc..... 50¢10¢50¢10¢10¢65¢

Chapin-Stephens Co..... 50¢10¢50¢10¢10¢10¢

Marking, Mortise, etc..... 50¢10¢50¢10¢10¢10¢

Scholl's Patent..... 50¢10¢50¢10¢10¢10¢

Door Hangers..... 50¢10¢50¢10¢10¢10¢

Fulton's Butt Gauge..... 50¢10¢50¢10¢10¢10¢

Stanley R. & L. Co.'s Butt & Babbet Gauge..... 50¢10¢50¢10¢10¢10¢

Wife, Brown & Sharpe's..... 50¢10¢50¢10¢10¢10¢

Wire, Morse's..... 50¢10¢50¢10¢10¢10¢

Wire P. S. & W. Co..... 50¢10¢50¢10¢10¢10¢

Gimlets—Single Cut—

Nail, Metal, Assorted, gro. \$1.00\$1.50

Spike, Metal, Assorted, gro. \$3.80\$3.50

Nail, Wood Handled, Assorted, gro. \$1.75\$2.00

Spike, Wood Handled, Assorted, gro. \$1.25\$1.50

Glass, American Window

See Trade Report.

Glasses, Level—

Chapin-Stephens Co..... 50¢10¢50¢10¢10¢10¢

Glue—Liquid Fish—

Bottles or Cans, with Brush..... 35¢50¢

Cans (1/4 pt., 1/2 pt., 1/4 gal., 1/2 gal.)..... 25¢50¢

International Glue Co. (Martin's)..... 40¢10¢50¢

Grease Axle—

Common Grade..... gro. \$5.50\$5.50

Dixon's Everlasting..... 10-15 palls, ea. \$5

Dixon's Everlasting, in bxs. per doz. 1..... \$1.90; 2..... \$2.00

Grips, Nipple—

Perfect Nipple Grip..... 40¢10¢25¢

Griddles, Soapstone—

Pike Mfg. Co..... 30¢30¢30¢10¢

Grindstones—

Bicycle Emery Grinder..... \$0.50

Bicycle Grindstones, each..... \$2.50\$3.00

Pike Mfg. Co.

Improve 1 Family Grindstones..... per inch, per doz. \$1.00..... 35¢45¢

Pike Mow Knife and Tool..... Grinder, each..... \$1.00

Velox Ball Bearing, mounted, Angle Iron Frames..... each, \$3.25

Halters and Ties—

Web..... 40¢25¢

Web and Leather Halters..... 70¢

Web and Manilla Rope Halters..... 70¢

Web and Cotton Rope Halters..... 70¢

Web and Cotton Rope Ties..... 70¢

Web and Cotton Rope Ties..... 70¢

Hammers—

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Handled Hammers..... 40¢10¢40¢10¢10¢

Sargent's C. B. New List.....40¢

Heavy Hammers and Sledges—

Under 3 lb.....lb 50¢ 75¢10¢5

3 to 5 lb.....lb 50¢ 75¢10¢5

Over 5 lb.....lb 50¢ 75¢10¢5

Wilkinson's Smitas.....95¢10¢10

Handles—

Agricultural Tool Handles..... 40¢50¢55¢

Axe, Pick, etc..... 40¢50¢55¢

Fork, Rake, etc..... 40¢50¢55¢

Fork, Shovel, Spade, etc..... 40¢50¢55¢

Long Handles..... 40¢50¢55¢

D Handles..... 40¢50¢55¢

Cross-Cut Saw Handles—

Ackins..... 40¢55¢

Champion..... 40¢55¢

Diaston's..... 40¢55¢

Mechanics' Tool Handle.....75

Auger, assorted.....gro. \$2.50\$2.85

Brad Axl.....gro. \$1.65\$1.85

Chisel Handles.....

Apple Tanged Firmer, gro. ass'd.....\$2.00\$2.65

Hickory Tanged Firmer, gro. ass'd.....\$2.00\$2.65

Apple Socket Firmer, gro. ass'd.....\$1.50\$1.49

Hickory Socket Firmer, gro. ass'd.....\$1.75\$1.95

Hickory Socket Framing, gro. ass'd.....\$1.45\$1.60

Hickory Socket Framing, gro. ass'd.....\$1.80\$1.75

File, assorted.....gro. \$1.30\$1.40

Hammer, Hatchet, Axe, etc..... 50¢

Hand Saw, Varnished, doz.....50¢75¢

Not Varnished..... 65¢75¢

Piano Handles.....

Jack, doz. 50¢; Jack Bolted..... 75¢

For, doz.....45¢; For, Bolted..... 90¢

Chapin-Stephens Co.....

Carving Tool..... 40¢40¢10¢

Chisel..... 60¢60¢10¢

File and Axl..... 60¢60¢10¢

Saw and Plane..... 40¢40¢10¢

Screw Driver..... 40¢40¢10¢

Millers Falls Ad. and Hatchet Auger Handles..... 15¢10¢

Nicholson Simplicity File Handle..... \$3.30\$3.50

Hangers—

NOTE.—Barn Door Hangers are generally quoted per pair, without track and parlor door hangers per double set with track, etc.

Barn Door, New Pattern, Round Groove, Regular.....

Inch..... 3 4 5 6 8

Single Doz.....\$0.90 1.25 1.40 1.95 2.50

Barn Door, New England Pattern, Check Back, Regular.....

Inch..... 3 4 5 6

Single Doz.....\$1.30 1.85 2.50 3.00

Alth Mfg. Co.....

Helliole No. 1..... per doz. \$12.00

Reliable No. 2..... per doz. \$15.00

Chicago Spring Butt Co.....

Prill..... 25¢

Oscillating..... 25¢

Big Twin..... 25¢

Chisholm & Moore Mfg. Co.....

Baggage Car Door..... 50¢

Elevator..... 30¢

Railroad..... 50¢

Crown & Crier Mfg. Co.....

1000 Axl..... 40¢

Parlor Bearing..... 90¢10¢

Parlor, Ball Bearing..... \$4.15

Parlor, Standard..... \$3.35

Parlor, New Model..... \$4.35

Parlor, New Champion..... \$2.25

Barn Door, Standard..... \$1.04\$1.51

Hinged..... \$6.40

Covered..... 50¢10¢10¢

Special..... 50¢10¢10¢25¢

Lawrence Bros.....

Advance..... 90¢

Cleveland..... 90¢10¢

Crown..... 90¢

Giant..... 50¢10¢

New York..... 60¢

Peerless..... 60¢10¢

Sterling..... 60¢

Swing, No. 95..... \$5.00

Union, No. 44, \$5.00; No. 45 \$7.00; No. 46, \$9.00.

McKinney Mfg. Co.....

No. 1, Special, \$15..... 60¢10¢

No. 2, Standard, \$18..... 60¢10¢

Hinged Hangers, \$16..... 50¢

Meyers' Staying Hangers..... 60¢

C. B. Sargent Mfg. Co.....

Lundy Parlor Door..... 50¢10¢

Monarch Barn Door..... 60¢10¢

Never Jump Hinge..... 50¢10¢

Peerless..... 60¢10¢

Perfection..... 70¢55¢

Phoenix..... 70¢55¢

Warner's Adjustable..... 70¢10¢

Warehouse Anti-Friction..... 60¢

Richards Mfg. Co.....

Pioneer Wood Track No. 3..... \$2.25

Imp'd Wood Track No. 5..... \$2.25

Imp'd Steel Track No. 7..... \$2.70

Imp'd Steel Track No. 7..... \$2.65

Ball B'r'g Steel Track No. 9..... \$2.50

Ball B'r'g Steel Track No. 10..... \$2.50

Roller B'r'g Steel Track No. 11..... \$2.45

Roller B'r'g Steel Track No. 12..... \$2.40

Roller B'r'g Steel Track No. 13..... \$2.35

Roller B'r'g Steel Track No. 14..... \$2.35

Ball B'r'g Trolley Track No. 15..... 40¢

Trolley Track No. 19..... 65¢5¢

Ball Bearing Tandem Trolley Track No. 18..... 40¢

Silent Adjustable Track No. 19..... 40¢

Auto Adjustable Track No. 22..... 40¢

Trolley B. D. No. 17..... \$1.60

Trolley F. D. No. 12..... \$2.70

Trolley F. D. No. 12..... \$2.70

Trolley F. D. No. 13..... \$2.70

Trolley F. D. No. 13..... \$2.70

Roller Bearing D. D. No. 25..... 70¢5

Roller Bearing U. S. B. D..... 70¢55¢

Anti Friction B. D..... 60¢10¢

Ives' Wood Track No. 1..... \$2.15

Ives' Imp'd Wood Track No. 2..... \$2.15

Safety Door Hanger Co.....

Storm King Saffery Co..... 60¢

U. S. Standard Hinge..... 60¢

Stowell Mfg. and Foundry Co.....

Acme Parlor Ball Bearing..... 40¢

Alax Hinge Door..... 60¢

Ap-x Parlor Door..... 50¢10¢55¢

Atlas..... 60¢

Baggage Car Door.....50¢

Oilmax Anti-Friction.....50¢10¢

Elevator.....40¢

Express.....50¢

Freight Car Door.....60¢

Interstate.....40¢10¢

Lundy Parlor Door.....50¢10¢

Magie.....60¢

Malheur.....60¢10¢

Nansen.....30¢55¢

Parlor Door.....50¢10¢

Railroad.....50¢10¢

Rex Hinge Door.....60¢

Street Car Door.....50¢

Steel, Nos. 300, 404, 500.....50¢10¢

Underwriter's Flr. Door.....40¢

Wild West Warehouse Door.....50¢

Zenith F. r

Wire Goods Co:	
Acme.....	100x105
Chief.....	70x105
Crowd.....	70x105
Czar.....	65x105
V Brac.....	70x110
Czar E. Wines.....	50x105

Wrought Iron—	
Box, 6 in., per doz.	\$1.00; 8 in., \$1.25;
10 in., \$2.50.	
Cotton.....	dos. \$1.05@1.25
Wrought Staples, Hooks, &c.—	
See Wrought Goods.	

Miscellaneous—	
Hooks, Hens, See Stops, Bench.	
Bush, Light, doz. \$5.50; Medium,	
\$6.00; Heavy, \$6.50	
Grass.....Nos. 1 3 4	
Best.....	\$1.50 1.75 3.00
Common.....	\$1.30 1.50 1.75
Potato and Manure.....	60x154
Wh. Metres.....	lb. 59x66
Hooks and Eyes:	
Brass.....	60x10x10x70x
Malleable Iron.....	70x5x70x10x
Covert Saddlery Works' Self Locking	
Gate and Door Hooks.....	60x
Ft. Madison Cut-Edge Corn Hooks.....	dos. \$5.25 net

Bench Hooks—See Bench Stops.

Corn Hooks—See Knives, Corn.

Horse Nails—See Nails, Horse.

Horseshoes—

See Shoes, Horse.

Hose Rubber—

Garden Hose, 3/4-inch:

Competition.....ft. 5 6 7 8

3-ply Standard.....ft. 6 7 8 9

4-ply Standard.....ft. 7 8 9 10

5-ply extra.....ft. 8 9 10 11

6-ply extra.....ft. 9 10 11 12

Cotton Garden, 3/4-in., coupled:

Low Grade.....ft. 6 7 8

Fair quality.....ft. 8 9 10

Irons—Sad—

From 4 to 10.....lb. 3 4 5 6

B. B. Sad Irons.....lb. 3 4 5 6

Chinese Laundry.....lb. 4 5 6 7

Chinese Sad.....lb. 4 5 6 7

Mrs. Potts', per set:

Nos.....50 55 60 65

Jap'd Tops 71 68 81 78

Tina Tops 74 71 84 81

New England Pressing, lb. 3 4 5 6

Pinking—

Pinking Irons.....dos. 50@60c

Soldering—

Soldering Coppers 3/4 and 3/8.....19@20c

1 1/2 and 2.....21@22c

Jacks Wagon—

Covert Mfg. Co.: Auto Screw.....30x55

Steel.....45x55

Covert's Saddlery Works: Dally.....60x105

Victor.....60x105

Lockport.....50x105

Lane's Steel.....30x105

Kettles—

Brass, Square, Plain.....20@25x

Enamelled and Cast Iron—See Ware, Hollow.

Knives—

Butcher, Kitchen, &c.—

Foster Bros. Butcher, &c.....30x

Smith & Hemenway Co.....40x105

Wilkinson Shear & Cutlery Co.....50x

Hay and Straw—See Hay Knives.

Corn—

Withington Acme, per doz., \$2.65; Dent,

\$2.75; Adj. Serrated, \$2.20; Serrated,

\$2.10; Yankee No. 1, \$1.50;

Yankee No. 2, \$1.15.

Drawing—

Standard List.....70x5@70x10x

Bradley's.....35x

C. E. Jennings & Co. Nos. 45, 46, 60x105

Jennings & Griffin, Nos. 51, 52, 60x105

Ohio Tool Co.'s.....70x

Swan's.....70x10x2x5x

Watrous.....16x10x10x

L. & J. White.....20x20x20x

Hay and Straw—

Lightning.....per doz. \$6.50@7.00

Iwan's Sickle Edge.....per doz. \$1.00

Iwan's Serrated.....per doz. \$1.00

Maine.....per doz. \$8.50

Mining—

Buffalo.....per gro. \$13.00

Miscellaneous—

Farriers.....per doz. \$3.00@3.55

Wostenholm's.....per doz. \$5.00@5.25

Knobs—

Base, 2 1/2-inch, Birch, or Maple,

Rubber tip, gro.....\$1.10@1.15

Carriage, Jap. all sizes.....gro. 40@45c

Lifters, Transom—

R & L.....38x45

Lines—

Wire Clothes, Nos., 18 19 20

100 feet.....\$2.20 \$2.00 1.65

75 feet.....\$1.80 1.70 1.30

Samson Cordage Works:

Solid Braided Chalk, No. 0 to 3.....40x

Silver Lake Braided Chalk, No. 0, \$6.00;

No. 1, \$6.50; No. 2, \$7.00; No. 3, \$7.50

Masons' Lines, Shade Cord, &c.: White

Cotton, No. 3 1/2, \$1.50; No. 4, \$2.00; No.

4 1/2, \$2.50; Colors, No. 3 1/2, \$1.75; No. 4,

\$2.25; No. 4 1/2, \$2.75; Linen, No. 3 1/2,

\$2.50; No. 4, \$3.50; No. 4 1/2, \$4.50.....20x

Tent and Awning Lines: No. 5, White

Cotton, \$7.50; Drab Cotton, \$8.50.....30x

Clothes Lines: White Cotton, 50 ft., \$2.75;

80 ft., \$3.25; 70 ft., \$3.75; 75 ft., \$4.25;

80 ft., \$4.25; 90 ft., \$4.75; 100 ft., \$5.25.....30x

Aniston Waterproof Clothes, 50 ft., \$

gro. \$36.00; Gilt Edge, \$24.00; Air Line

\$24.00; Acme, \$18.00; Alabama, \$17.00;

Empire, \$18.00; Advance, \$15.00; Ori-

ole, \$22.00; Albermarle, \$15.00; Ecose,

\$15.00; Chicago, \$12.50; Standard,

\$11.00; Columbia, \$9.50.....25x

Locks—

Cabinet—

Cabinet Locks.....53x4@33x4x7x4x

Door Locks, Latches, &c.—

[Net prices are very often made on

these goods.]

Reading Hardware Co.....50x

R. & E. Mfg. Co.....40x

Sargent & Co.....40x105

Stowell's Steel Door Locks.....50x

Elevator—

Stowell's.....50x

Padlocks—

Wrought Iron.....7x10x10x80x5x

R. & E. Mfg. Co. Wrt. Steel and Brass.....75x75x10x

Sash, &c.—

Ives' Patent:

Bronze and Brass.....62x4x

Crescent.....50x

Iron.....62x4x

Wrought Bronze and Brass.....55x

Wrought Steel.....55x

Reading.....net 50x

Machines—

Boring—

Com. Upright, Without Augers.....\$2.00

Com. Angular, Without Augers.....\$2.25

Without Augers.....55x

R. & E. Mfg. Co.: Upright. Angular.

Improved No. 3, \$4.25 No. 1, \$5.00

Improved No. 4, 3.75 No. 2, 3.38

Improved No. 5, 2.75 No. 1, 3.50

Jennings', No. 4, 3.15 No. 1, 3.50

Miller's Patent.....5.75

Snell's, Rice's Pat. 2.50 2.75

Corking—

Reisinger Invaluable Hand Power.....

per doz. \$48.00

Fence

Williams Fence Machines.....each, \$5.50

Holating—

Moore's Anti-Friction Differential Pul-

ley Block.....30x

Moore's Hand Hoist, with Lock Brake, 20x

Ice Cutting—

Chandler's.....15x10x

Washing—

Boss Washing Machine Co.: Per doz.

Boss No. 1, Boss Rotary.....\$57.00

Boss No. 7, Dietz Rotary.....\$54.00

Champion Rotary; Banner No. 1.....\$45.00

Standard Champion No. 1.....\$48.00

Standard Perfection.....\$26.00

Cinti Square Western.....\$30.00

Uneda American, Round.....\$29.00

Mallets—

Hickory.....4x5x5@50x

Lignumvite.....4x5x5@50x

Timbers', Hickory and Applewood,

dos.....50x55c

Mashers, Vegetable—

Western, W. G. Co., Potato.....60x10x

Mats—

Elastic Steel (W. G. Co.).....10x

Mattocks—

See Picks and Mattocks.

Milk Cans—See Cans, Milk

Mills—Coffee, etc.—

Rutpridge Mfg. Co.....25@30x

National List Jan. 1, 1902.....30x

Parker's Columbia & Victoria, 50x10@90x

Parker's Box and Side.....50x10@90x

Sun, No. 1, 1 lb mill.....per doz. \$30.00

SWT, Laid Bros Co.....30x

Mowers, Lawn

Net prices are generally quoted.

Cheap.....all sizes, \$1.75@9.00

Good.....all sizes, \$2.25@5.50

High Grade 4.25 4.50 4.75 5.00

Continental.....6.00

Great American.....7.00

Great American Ball Bearing, new list, 7.00

Quaker City.....10x5x

Pennsylvania, Jr., Ball Bearing.....6.00

Pennsylvania Golf.....8.00

Pennsylvania Horse.....8.00

Pennsylvania Pony.....8.00

Philadelphia.....8.00

Styles M. & C. K. T.....7.00x5x

Style A, all steel.....6.50x5x

Style F, High Wheel.....7.00x10x5x

Drexel and Gold Coin, low list.....4.00x5x

Nails—

Cut and Wire. See Trade Report.

Wire Nail; and Brads, Paired.

List July 20, 1899.....85¢ Pick 10¢ 90¢

Hungarian, Finishing, Upholster-

ers', &c. See Tacks.

Horse—

Nos. 6 7 8 9 10

A. C. R.....23 22 21 21.....40x4x

Anchor 23 21 20 19 18.....40x5x

Champion 28 26 24 23 22.....50x

oleman, 13 12 11 11 11.....net

Maud S., 23 22 21 21 21.....50x

New Haven 23 21 20 19 18.....40x5x

Putnam, 23 21 20 19 18.....35x4x

New Firm 19 18 17 16 15.....10x10x

Western, per lb.....40x

Jobbers' special brands, per lb., 30¢ 35¢

Picture—

1 1/2 2 3 3 1/2 in.

Brass Head, 1/2 60 70 95 1.00 gro.

Por. Head.....1.10 1.10 1.10

Nippers, See Pliers and Nippers.

Nuts—

Cold Punched: Off list.

Mfrs. or U. S. Standard.

Square, plain.....\$5.10

Hexagon, plain.....\$5.60

Square, C. T. & R.....\$5.30

Hexagon, C. T. & R.....\$6.00

Hot Pressed:

Mfrs., U. S. or Nar. Gauge Stan'd.

Square Blank.....\$5.80

Hexagon Blank.....\$6.30

Square Tapped.....\$5.80

Hexagon Tapped.....\$6.30

Stanley's Duplex..... 30@30&10&10%
Woods' Extension..... 33@44

Poachers, Egg—

Buffalo Steam Egg Poachers, # doz.
No. 1, \$6.00; No. 2, \$3.00; No. 3,
\$3.00; No. 4, \$1.20..... 50%

Points, Glaziers'—

Bulk and 1 lb. papers..... lb. 64c
1/2 lb. papers..... lb. 64c
1/4 lb. papers..... lb. 64c

Pokes, Animal—

Pl. Madison Hawkeye..... # doz. \$3.25
Pl. Madison Western..... # doz. \$3.00

Polico Goods—

Manufacturers' Lists..... 25@25&55
Towers..... 25%

Polish—Metal—

Prestolite Liquid, No. 1 (1/4 pt.), # doz.
\$3.00; No. 2 (1 qt.), \$9.75..... 40%

Prestolite Paste..... 40&105
George William Hoffman..... lb. 64c

U. S. Metal Polish Paste, 3 oz. boxes,
doz. \$4.50; 1/2 lb. boxes,
doz. \$1.25; 1 lb. boxes, # doz. \$2.25.

U. S. Liquid, 8 oz. cans, # doz. \$1.25;
gr. \$12.00

Barkeepers' Friend Metal Polish, # doz.
\$1.75; # gr. \$18.00.

Wynn's White Silk, 1/4 pt. cans, # doz.
\$2.00

Stove—

Black Eagle Benzine Paste, 5 lb. cans,
doz. \$1.10

Black Eagle Liquid, 1/4 pt. cans, # doz. 75c

Black Kid Paste, 1 lb. cans, each, \$3.00

Ladd's Black Paste, gr. \$10.00..... 50%

Joseph Dixon's, # gr. \$5.75..... 10%

Dixon's Plumbago..... # gr. \$4.50

Frisdale..... # gr. \$4.50..... 10%

Gem, # gr. \$4.50..... 10%

Japanese..... # gr. \$3.50

Jet Black..... # gr. \$3.50

Peelless Iron Enamel, 10 oz. cans, # doz.
\$1.50

Wynn's:

Black Silk, 5 lb. pail..... each 70c

Black Silk, 1/2 lb. box..... # doz. \$1.00

Black Silk, 5 oz. box..... # doz. \$0.75

Black Silk, 1/4 pt. liq..... # doz. \$1.00

Poppers, Corn—

1 qt., Square..... gro. \$2.00

1 qt., Round..... gro. \$1.00

1/2 qt., Square..... gro. 1.10

2 qt., Square..... gro. 18.00

Post Hole and Tree Augers and Diggers—

See also Diggers, Post Hole, &c.

Posts, Steel—

Steel Fence Posts, each, 5 ft., 42¢; 6
ft., 46¢; 6 ft., 48¢.

Steel Hitching Posts, each..... \$1.30

Potato Parers—

See Parers, Potato.

Pots—Glue—

Enameled..... 40%

Tinned..... 35%

Powder—

In Canisters:

Duck, 1 lb. each..... 45c

Fine Sporting, 1 lb. each..... 75c

Rifle, 1/4 lb. each..... 18c

Rifle, 1 lb. each..... 25c

King's Semi-Smokeless..... 25c

Keg (25 lb. bulk)..... \$3.50

Half Keg (12 1/2 lb. bulk)..... \$3.50

Quarter Keg (6 1/4 lb. bulk)..... \$1.90

Case 24 (1 lb. cans bulk)..... \$5.50

Half case (1 lb. cans bulk)..... \$4.50

King's Smokeless..... Shot Gun, Rifle

Keg (25 lb. bulk)..... \$13.00

Half Keg (12 1/2 lb. bulk)..... 6.25

Quarter Keg (6 1/4 lb. bulk)..... 3.25

Case 24 (1 lb. cans bulk)..... 14.00

Half case 12 (1 lb. cans bulk)..... 8.75

Robin Hood Smokeless Shot Gun..... 50&20%

Presses—

Fruit and Jelly—

Enterprise Mfg. Co..... 30&25%

Sensible..... 33&45

2 qt., \$2.00; 4 qt., \$4.00; 10 qt., \$6.00 each.

Seal Presses—

Morrill's No. 1, per doz. \$20.00..... 50%

Pruning Hooks and Shears—See Shears.**Pullers, Nail—**

Cyclops..... 50%

Dudley Improved Nail Puller..... 30%

Miller's Falls, No. 3, per doz. \$12.00..... 30%

Pearson No. 1, Cyclops Spike Puller,
each \$80.00..... 50%

Pencan, # doz. \$9.00..... 40&105

Seranton, Case Lots:

No. 2 B (large)..... \$5.50

No. 3 B (small)..... \$3.00

Smith & Hemenway Co.:

Ajax..... 60%

Diamond B. No. 2, ca-e lots, # doz. \$6.00

Diamond B. No. 3, case lots, # doz. \$5.50

Eureka..... 40%

Giant, No. 1, # doz. \$1.50; No. 2, \$1.00;
No. 3, \$1.50..... 40%

Yankee..... 60%

Pulleys—Single Wheel—

Inch..... 2 3/4 3

Awning, doz. \$0.55 3/4 1.15

Hay Fork, Swiss or Solid Eye,
doz., 4 in., \$1.15; 5 in., \$1.40

Inch..... 2 3/4 3/4

Hot House, doz. \$0.70 3/4 1.25

Inch..... 1 1/4 1 1/4 1 1/4 2

Screw, doz. \$0.18 1/4 3/4 2

Inch..... 1 1/4 3/4 2

Side, doz. \$0.30 3/4 1.05 3/4

Inch..... 1 1/4 1 1/4 2 3/4

Tackle, doz. \$0.30 1/4 1.38 1.00

Stowell's:

Coiling or End, Anti-Friction..... 60&105

Dumb Waiter, Anti-Friction..... 60&105

Electric Light..... 60%

Slide, Anti-Friction..... 60&105

Sash Pulleys—

Common Frame; Square or Round

End, per doz., 1 1/2 and 2 in., 16@19c

Auger Mortise, no Face Plate, per
doz. 1 1/2 and 2 in., 16@19c

Auger Mortise, with Face Plate, per
doz., 1 1/2 and 2 in., 16@19c

Aeme..... 13 in., 16; 2 in., 19

Common Sense, 1 1/2 in., 16; 2 in., 19

9 in., 20c

Fox-All-Steel, Nos. 3 and 7, 2 in., # doz. 50%

Grand Rapids All-Steel Noiseless..... 50%

Ideal..... 70&55

Niagara..... 1 1/2 in., 16; 2 in., 19

No. 26, Troy..... 1 1/2 in., 14; 2 in., 16

Star..... 1 1/2 in., 16; 2 in., 19

Tackle Blocks—See Blocks.

Pumps—

Cistern..... 60@20&10%

Pitcher Spout..... 80@20&10%

Wood..... 50@50&10%

Pump Leathers—

Plunger and Lower Valve—Per gro.:

Inch..... 2 3/4 3/4 3/4 3/4

\$2.20 2.50 2.75 3.00

Inch..... 3 3/4 3/4 3/4 3/4

\$3.50 3.60 3.85 4.10 4.40

Plunger Cup Leathers—Per 100:

Inch..... 3/4 3/4 3/4 3/4

\$2.75 3.85 5.00 6.00

Barnes Dbl. Acting (low list)..... 50&10%

Contractors' Rubber Diaphragm No. 2

B. & L. Hook Co..... \$16.00

Daily Spray Pump..... # doz. \$2.30

Flat & Walling's Fast Mail (low list)..... 55%

Flat & Walling's Pitcher Spout..... 30%

National Specialty Mfg. Co., Measur-

ing..... \$4.00

Mechanical Sprayer..... \$1.20

Myer's Pumps, low list..... 50%

Myer's Power Pumps..... 50%

Myer's Spray Pumps..... 50%

Punches—

Saddlers' or Drive, good, # doz. 65@70c

Spring, single tube, good quality..... \$1.75@3.00

Revolving (tubes)..... doz. \$5.50@3.75

Bemis & Call Co.'s Cast Steel Drive..... 50%

Bemis & Call Co.'s Check..... 50%

Benard Spring Belt Punches..... 33&45

Lodi Spring Belt Punches..... 30%

Morrill's No. 1 (A.B.C.), # doz., \$15.00..... 50%

No. 2, # doz. \$22.50..... 50%

Niagara Hollow Punches..... 40%

Niagara Solid Punches..... 55&10%

Paragon Spring Belt Punches..... 50%

Steel Screw, B. & K. Mfg. Co..... 40%

Timbers' Hollow, P. S. & W. Co., 35&55

Tinners' Solid, P. S. & W. Co., # doz.,
\$1.44..... 60%

Rail—Barn Door, &c.—

Cast Iron, Barn Door; Flange Screw

Holes for Rd. Groove Wheels:

1/4 3/4 1 in.

\$1.70 \$2.10 \$3.00 100 feet.

Angular for Sq. Groove Wheels:

Small. Med. Large.

\$1.50 1.90 3.60 100 feet.

Sliding Door, Iron Painted..... 34@35c

Sliding Door, Wrought Brass, 1 1/2

in..... lb. 35c..... 50%

Allen Trg. Co., No. 1, Reliable Hanger

Track, # foot..... 8c

Allen Trg. Co., No. 2, Reliable Hanger

Track, # foot..... 10c

Cronk's Double Braced Steel Rail, #

foot..... 30c

Cronk's O. N. T. Rail..... 54c

Lane's Hinged Track, # 100 ft., 1 in.,

20; 1 1/2 in., \$4.00

Lane's O. N. T., # 100 ft., 1 in., \$3.00;

1 1/2 in., \$3.70; 1 3/4 in., \$4.00

Lane's Standard, 1 1/2 in., # 100 ft..... 4.00

Lawrence Bros., # ft. 1 1/2..... 4.00

Lawrence Bros. New York..... 34c

McKinney's Hinged Hanger Rail #

foot, 1 1/2 in., \$3.00

McKinney's Bone Better..... # ft. 3/4 c

McKinney's Standard..... # ft. 4 c

Myer's Stayon Track..... 30&10%

Safety Door Hanger Co.'s Storm King

Safety..... 60%

Safety Door Hanger Co.'s U. S. Standard

Safety..... 60%

Smith's Wrought Bracket, Plain..... 34c

Smith's Special..... 44c

Smith's Never Jump, per ft. 1 1/2..... 50%

Smith's Plain Steel..... 30%

Smith's Milled Steel..... 44c

Stowell's Cast Rail..... # ft. 1 1/2 c

Stowell's Steel Rail..... # ft. 1 1/2 c

Stowell's Wrought Bracket, 1 1/2-16 in.,

ft. 3/4

Stowell's Wrought Bracket, 1 1/2-15 in.,

ft. 7/8

Sweet's Hylo, per ft. 1 1/2..... 50&10%

Sweet's P. L. B. Steel Rail, # 100 ft., \$3.00

Rakes—

Net Prices, Malleable Rakes:

10 12 14 16-tooth

Shank..... \$1.50 1.60 1.75 1.55

Socket..... \$1.65 1.70 1.95 2.10

Steel, Garden and Gravel, Aug. 1,

'99 List..... 70%

Weldless Steel..... 75&65

Malleable Iron, Garden..... 70&10%

Lawn Rakes, Metal Head, per doz.

20 teeth..... \$5.25@5.50

24 teeth..... \$5.50@5.75

Fort Madison Red Head Lawn..... \$3.25

Fort Madison Blue Head Lawn..... \$2.70

Jackson Lawn, 20 and 30 teeth, # doz.,
net, \$4.25

Kohler's:

Lawn Queen, 20-tooth, # doz..... \$3.45

Lawn Queen, 24-tooth, # doz..... \$3.60

Paragon, 20-tooth, # doz..... \$2.75

Paragon, 24-tooth, # doz..... \$2.88

Steel Garden, 14-tooth, # doz..... \$2.88

Malleable Garden, 14-tooth, # doz..... \$2.00

Rasps, Horse—

Diston's..... 75%

Heiler Bros..... 70&50@10&55%

McCaffrey's American Standard..... 70&10&55%

New Nicholson..... 70&10&55%

See also Files.

Screws—Bench and Hand—

Bench, Iron, doz. 1 in. \$2.50 to \$2.75
 1 1/2, \$3.00 to \$3.25
 2, \$3.50 to \$3.75
 Bench, Wood, Beech, doz. 30 to 40¢
 Hand, Wood, doz. 30 to 40¢
 R. Bliss Mfg. Co., Hand, doz. 30 to 40¢
 Chapin-Stephens Co., Hand, doz. 30 to 40¢
 Ohio Tool Co., Bench and Hand, doz. 30 to 40¢
Coach, Lag and Hand Rail—
 Lag, Common Point, list Oct. 1, 99, 80¢ to 85¢
Coach and Lag, Gimlet Point, list
 Oct. 1, '99, 80¢
 Hand Rail, list Jan. 1, '81, 70¢ to 10¢

Jack Screws—

Standard List, 75¢ to 10¢ to 80¢ to 5¢
 Millers Falls, 50¢ to 10¢ to 5¢
 Millers Falls, Roller, 50¢ to 10¢
 P. S. & W., 50¢ to 50¢ to 5¢
 Sargent, 75¢ to 40¢

Machine—

List Jan. 1, '98,
 Flat or Round Head, Iron, 50¢ to 50¢ to 10¢
 Flat or Round Head, Brass, 50¢ to 50¢ to 10¢

Set and Cap—

Set (Iron or Steel), 75¢ Extra
 Sq. Hd. Cap, 10¢
 Hex. Hd. Cap, 70¢ often
 Hd. or Fillister Hd. Cap 65¢ given.

Wood—

List July 23, 1903,
 Manufacturers' printed discounts:
 Flat Head, Iron, 87¢ to 10¢
 Round Head, Iron, 85¢ to 10¢
 Flat Head, Brass, 85¢ to 10¢
 Round Head, Brass, 80¢ to 10¢
 Flat Head, Bronze, 77¢ to 10¢
 Round Head, Bronze, 75¢ to 10¢
 Drive Screws, 87¢ to 10¢

Scroll Saws—See Saws, Scroll.**Scythes—**

Per doz.
 Clipper Pattern, Grass, \$4.25 to \$5.00
 Full Polished Clipper, \$5.75 to \$5.50
 Grain, \$7.00 to \$7.50
 Clipper, Grain, \$7.50 to \$8.25
 Weed and Bush, \$4.50 to \$5.00

Seeders—Raisin—

Enterprise, 25¢ to 30¢
Sets—Aul and Tool—
 Brad Aul and Tool Sets:
 Wood Hdl., 10 Auls doz. \$2.00 to \$2.25
 Wood Hdl., 14 Auls, 6 Tools, doz. \$2.50 to \$2.00

Aiken's Sets, Aul and Tools:
 No. 9, doz. \$10.00, 50¢ to 10¢ to 10¢
 Fray's Adj. Tool Hdl., Nos. 1, 11; 2, \$18; 3, \$12; 4, \$9; 5, \$7, 50¢
 C. E. Jennings & Co.'s Mod. Tool Holders, 30¢ to 10¢
 Millers Falls Adj. Tool Hdl., No. 1, \$12; No. 4, \$12; No. 5, \$15; 15¢ to 10¢
 Stanley's Excelsior, No. 1, \$7.50; No. 2, \$4.00; No. 3, \$3.50, 30¢ to 30¢ to 10¢ to 10¢

Garden Tool Sets—

Ft. Madison, Trench P., 50¢, Rake and Shovel, 50¢, 50¢, 50¢, \$2.00

Nail—

Square, per gro. \$2.25 to \$2.50
 Round, Blk. and Pol., assorted, gro. \$1.80 to \$2.00
 Octagon, gro. \$1.50 to \$1.75
 Buck Brothers, 75¢
 Cannon's Diamond Point, per gr. \$1.25
 Mayhew's, per doz. \$2.00
 Snell's Corrugated, Cup Pt. per doz. \$7.50
 Snell's Knurled, Cup Pt., per doz. \$7.50

Rivet—

Regular list, 70¢ to 10¢ to 75¢

Saw—

Alken's Genuine, 50¢ to 10¢
 Imitation, 50¢ to 10¢
 Criterion, 40¢
 Adjustable, 40¢
 Bemis & Call Co.'s, 30¢
 Cross Cut, 30¢
 Hammer, new Pat., 45¢
 Plate, 20¢
 Spring Hammer, 30¢
 Diston's Star and Monarch, 25¢
 Morrill's No. 1, \$15.00, 50¢
 Nos. 3 and 4, Cross Cut, \$30.00, 50¢
 No. 5, Mill, \$30.00, 50¢
 Nos. 10, 11, 9, \$15.00, 50¢
 No. 1 Old Style, \$10.00, 50¢
 Special, \$16.25, 50¢
 Giant Royal, Cross Cut, 50¢ doz. \$5.50
 Royal, Hand, 50¢ doz. \$5.00
 Taintor Positive, 50¢ doz. \$6.75

Shaving—

Fox Shaving Sets, No. 3, per doz. \$24.00 net

Sharpeners, Knife—

Chicago Wheel & Mfg. Co., 65¢

Shaves Spoke—

Iron, doz. \$1.00 to \$1.15
 Wood, doz. \$1.75 to \$2.00
 Bailey's (Stanley R. & L. Co.), 70¢ to 10¢ to 10¢
 Chapin-Stephens Co., 40¢ to 10¢ to 10¢
 Goodell's, 50¢ doz. \$9.00, 15¢ to 10¢
 Wood's F1 and F2, 50¢

Shears—

Cast Iron, 7 8 9 in.
 Best, \$16.00 18.00 20.00 gro.
 Good, \$13.00 15.00 17.00 gro.
 Cheap, \$5.00 6.00 7.00 gro.
 Straight Trimmers, etc.:
 Best quality, Jap., 70¢ to 70¢ to 10¢
 Nickel, 60¢ to 60¢ to 10¢
 Fair qual. Jap., 80¢ to 80¢ to 5¢
 Nickel, 75¢ to 75¢ to 10¢
 Tailors' Shears, 40¢ to 40¢ to 5¢
 Acme Cast Shears, 40¢ to 40¢ to 5¢
 Heinisch's Tailors' Shears, 10¢
 Wilkinson's Heders, 1900 list 45¢
 Wilkinson's Branch, Lawn and Border, 40¢
 Wilkinson's Sheep, 1900 list, 50¢

Tinners' Snips—

Steel Blades, 20¢ to 20¢ to 10¢
 Steel Laid Blades, 40¢ to 10¢ to 5¢
 Forge Handles, Steel Blades, Berlin, 40¢ to 40¢ to 10¢

Heinisch's Snips, 40¢
 Jennings & Griffin Mfg. Co.'s, 6¢ to 10¢
 Niagara Snips, 40¢ to 10¢
 P. S. & W. Co., 40¢
 Triumph Pipe Shear, 40¢ to 10¢

Pruning Shears and Tools—

Cronk's Grape Shears, 35¢ to 40¢
 Cronk's Pruning Shears, 35¢ to 40¢
 Diston's Combined Pruning Hook and Saw, 50¢ to 10¢ to 10¢
 Diston's Pruning Hook, 50¢ to 10¢ to 10¢
 John T. Henry Mfg. Co.:
 Pruning Shears, all grades, 40¢ to 40¢ to 5¢
 Orange Shears, 50¢ to 10¢ to 5¢
 Grape, 40¢ to 10¢ to 5¢
 Tree Pruner, 75¢
 P. S. & W. Co., 35¢ to 40¢

Sheaves—Sliding Door—

Stowell's Anti-Friction, 50¢
 Patent Roller Hatfield's, Sargent's list, 70¢ to 10¢
 Reading, 50¢
 R. & E. list, 50¢
 Wrightville Hatfield Pattern, 50¢

Sliding Shutter—

Reading list, 50¢
 R. & E. list, 35¢ to 40¢
 Sargent's list, 50¢ to 10¢

Shells—Shells, Empty—

Brass Shells, Empty:
 First quality, all gauges, 60¢ to 5¢
 Climax, Club, Rival, 10 and 12 gauge, 65¢ to 5¢
 Paper Shells, Empty:
 Acme, Ideal, Leader, New Rapid, Magic, 10, 12, 16 and 20 gauge, 25¢ to 5¢
 Blue Rival, New Climax, Challenge, Monarch, Deference, Repeater, Yellow Rival, 10, 12, 13 and 20 gauge, 30¢
 Climax, Union, League, New Rival, 10 and 12 gauge, 25¢
 Climax, Union, League, New Rival, 14, 16 and 20 gauge (\$7.50 list), 30¢
 Expert, Metal Lined and Pigeon, 10, 12, 16 and 20 gauge, 30¢ to 5¢
 Robin Hood, Low Brass, 30¢ to 10¢
 Robin Hood, High Brass, 30¢ to 10¢

Shells, Loaded—

Loaded with Black Powder, 40¢
 Loaded with Smokeless Powder, medium grade, 40¢ to 5¢
 Loaded with Smokeless Powder, high grade, 40¢ to 10¢ to 10¢
 Robin Hood Smokeless Powder, Robin Hood, Low Brass, 30¢
 Comets, High Brass, 50¢ to 10¢ to 5¢

Shoes, Horse, Mule, &c.—

F. O. b., Pittsburg:
 Iron, per keg \$4.00
 Steel, per keg \$3.85
 Burden's, all sizes, per keg, \$3.90

Shot—

Drop, up to B, 25-lb. bag, \$1.67
 Drop, B and larger, per 25-lb. bag, \$1.85
 Buck, 25-lb. bag, \$1.85
 Chilled, 25-lb. bag, \$1.85

Shovels and Spades—

Association List, Nov. 15, 1903, 40¢

Sieves and Sifters—

Hunter's Imitation, gro. \$10.50 to \$11.00
 Buffalo Metallic, 14 in. S. & Co. per gr.:
 14 to 16 16 to 18 18 to 20
 \$13.20 \$13.50 \$14.40
 National Mfg. Co.:
 Victor, per gro. \$12.00
 Surprise, per gro. \$11.00
 No Name, per gro. \$11.00
 Shaker Barbers Pat. Flour Sifters, 50¢
 per doz. \$3.00

Sieves, Tin Rim—

Per dozen.
 Mesh, 1 1/2 16 13 20
 Black, full size, \$1.20 1.25 1.30 1.35
 Plated, full size, \$1.30 1.35 1.40 1.45
 Black, scant, 1.30 1.35 1.40 1.05

Sieves, Wooden Rim—

Nested, 10, 11 and 12 inch.
 Mesh 15, Nested, doz. \$0.90 to 0.95
 Mesh 20, Nested, doz. 1.00 to 1.05
 Mesh 25, Nested, doz. 1.30 to 1.40

Sinks—

Cast Iron—
 Standard list, 60¢ to 60¢ to 10¢
 NOTE—There is not entire uniformity lists used by jobbers.

Skains, Wagon—

Cast Iron, 75¢ to 75¢ to 10¢
 Steel, 40¢ to 40¢ to 10¢

Slates, School—

Factory Shipments.

"D" Slates—

Noiseless Slates, 60¢ to 5¢ to 5¢

Slaw Cutters—See Cutters.**Slicers, Vegetable—**

Sterling No. 10, \$3.50, 83¢

Snaps, Harness—

German, 40¢ to 40¢ to 10¢

Covert Mfg. Co.: Derby, 30¢ to 30¢ to 5¢

High Grade, 45¢
 Jockey, 30¢ to 10¢
 Trojan, 45¢
 Yankee, Roller, 30¢ to 5¢
 Covert's Saddlery Works:
 Crown, 60¢
 German, 60¢
 Model, 60¢
 Triumph, 60¢
 Onida Community, 60¢
 Solid Sirel, 60¢
 Sargent's Patent Guarded, 60¢ to 10¢

Snaths—

Scythe, 40¢

Snips, Tinners'—See Shears.**Spoons and Forks—****Silver Plated—**

Good Quality, 50¢ to 10¢ to 60¢ to 5¢
 Cheap, 60¢ to 60¢ to 10¢
 International Silver Co., 1847 Rogers Bros. and Rogers & Hamilton, 40¢ to 10¢
 Rogers & Bro., William Rogers Eagle Brand, 50¢ to 10¢
 Anchor, Rogers Brand, 60¢
 Wm. Rogers & Son, 60¢ to 10¢
 Simeon L. & Geo. H. Rogers Co.:
 Silver Plated Flat Ware, 60¢
 No. 77 Silver Plated Ware, 60¢ to 10¢

Miscellaneous—

German Silver, 60¢ to 60¢ to 5¢
 Cartanagous Cutlery Co.:
 Yukon Silver, 50¢
 Simeon L. & Geo. H. Rogers Co.:
 German or Nickel Silver, Special list, 10¢ to 10¢

Tinned Iron—

Teas, per gro. 45¢ to 50¢
 Tables, per gro. 90¢ to \$1.00

Springs—Door—

Chicago (Coll), 40¢ to 10¢
 Gem (Coll), 20¢
 Reliance (Coll), 20¢
 Star (Coll), 30¢
 Torrey's Rod, 39 in., 50¢ to 10¢
 Victor (Coll), 50¢ to 10¢ to 10¢

Carriage, Wagon, &c.

1/4 in. and Wider:
 Black or 1/4 Bright, lb., 1/4 to 5¢
 Bright, lb., 1/4 to 5¢
 Painted Seat Springs:
 1/4 x 22 26 per pr., 60¢ to 55¢
 1/4 x 2 x 28 per pr., 60¢ to 55¢
 1/4 x 2 x 33 and narrower, per pr., 80¢ to 85¢

Sprinklers, Lawn—

Enterprise, 25¢ to 30¢
 Philadelphia No. 1, per doz. \$12; No. 2, \$15; No. 3, \$24

Squares—

Nickel plated, list Jan. 5, 1900.
 Steel and iron, 70¢ to 10¢ to 70¢ to 10¢
 Rosewood Hdl. Try Square and T-Bevels, 60¢ to 10¢ to 70¢
 Iron Hdl. Try Squares and T-Bevels, 60¢ to 10¢ to 70¢
 Diston's Try Sq. and T-Bevels, 60¢ to 10¢ to 70¢
 Winterbottom's Try and Miter, 40¢ to 10¢ to 10¢

Squeezers—Lemon—

Wood, Common, gro., No. 6, \$5.25
 \$5.50; No. 1, \$6.25 to \$6.50.
 Wood, Porcelain Lined, Cheap, 10¢
 Good Grade, doz. \$1.60
 Tinned Iron, doz. \$0.75 to \$1.25
 Iron, Porcelain Lined, doz. \$1.75

Staples—

Barbed Blind, lb. 60¢ to 5¢
 Electricians', Association list, 80¢ to 10¢ to 10¢
 Fence Staples, Plain \$2.25; Galvanized, \$2.55
 Poultry Netting, Staples, per lb., 25¢ to 40¢
 Grand Crossing Tack Co.'s list, 80¢ to 10¢

Steels, Butchers'—

Dick's, 30¢
 Foster Bros., 30¢
 C. & A. Hoffmann's, 40¢

Steelyards, 30¢ to 30¢ to 10¢**Stocks and Dies—**

Blacksmiths', 50¢ to 50¢ to 10¢
 Curtis Reversible Ratchet Die Stock, 25¢
 Derby Screw Plates, 25¢
 Gardner Die Stocks No. 1, 50¢
 Gardner Die Stocks, larger sizes, 40¢
 Green River, 25¢
 Lightning Screw Plate, 25¢
 Little Giant, 25¢
 Reece's New Screw Plates, 25¢ to 30¢

Stone—**Scythe Stones—**

Chicago Wheel & Mfg. Co.:
 Gem Corundum, 10 inch, \$5.00 per gro., 12 inch, \$10.50
 Norton Emery Scythe Stones:
 Less than grove lots, per gro. \$9.00
 One gross or more, per gro. \$7.20
 Lots of 10 gross or more, per gro. \$6.00
 Pike Mfg. Co. 1901 list:
 Black Diamond S. S., per gro. \$12.00
 Lamolite S. S., per gro. \$11.00
 White Mountain S. S., per gro. \$9.00
 Green Mountain S. S., per gro. \$6.00
 Extra Indian Pond S. S., per gro. \$7.50
 No. 1 Indian Pond S. S., per gro. \$7.00
 No. 2 Indian Pond S. S., per gro. \$4.50
 Leader Med End S. S., per gro. \$4.50
 Balance of 1901 list 33¢ to 5¢

Oil Stones, &c.

Chicago Wheel & Mfg. Co., 1901 list:
 Gem Corundum Oil, Double Grit, 50¢
 Gem Corundum Oil, Single or Double Grit, 55¢
 Gem Corundum Oil, 55¢
 Gem Corundum Razor Hones, 50¢
 Pike Mfg. Co. 1901 list:
 Arkansas Stone, No. 1, 3 to 5 in., \$2.80
 Arkansas Stone, No. 1, 5 to 8 in., \$3.50
 Arkansas Stone, No. 1, 8 to 10 in., \$4.00
 Lily White Washita 4 to 8 in., 60¢
 Washita Stone, Extra, 4 to 8 in., 50¢
 Washita Stone, No. 1, 4 to 8 in., 40¢
 Washita Stone, No. 2, 4 to 8 in., 30¢
 Lily White Slips, 90¢
 Rosy Red Slips, 90¢
 Washita Slips, Extra, 90¢
 Washita Slips, No. 1, 70¢
 India Oil Stones (entire list), 33¢ to 5¢

Hindustan No. 1, Regular, 50¢ to 5¢
 Hindustan No. 1 Small, 50¢ to 5¢
 Axe Stones (all kinds), 50¢ to 5¢
 Turkey Oil Stones, ex. 5 to 8 in., 50¢
 Quaker Creek Stones, 4 to 8 in., 50¢
 Quaker Creek Slips, 40¢
 Sand Stone, 50¢
 Belgian, German and Swaty Razor Hones, 50¢
 Natural Grit Carving Knife Hones, 50¢
 Quick Edge Pocket Knife Hones, 50¢
 Mounted Kitchen Sand Stone, 50¢
 do., 1.50

Stoners—Cherry—

Enterprise, 25¢ to 30¢

Stops, Bench—

Millers Falls, 15¢ to 10¢
 Morrill's, No. 1, \$10.00, 50¢
 Morrill's, No. 2, \$12.50, 50¢
 Whipple's Combination, 50¢ to 20¢

Door—

Chapin-Stephens Co., 60¢ to 60¢ to 10¢

Plane—

Chapin-Stephens Co., 30¢

Straps—Box—

Cary's Universal, case lots, 20¢ to 10¢ to 10¢

Hame—

Covert's Saddlery Works, 60¢ to 10¢

Stretchers, Carpet—

Cast Iron, Steel Points, doz. 55¢ to 60¢
 Socket, doz. \$1.75
 Excelsior Stretcher and Tack Hammer Combined, per doz. \$6.00, 20¢

Stuffers, Sausage—

Enterprise Mfg. Co., 25¢ to 25¢ to 75¢
 National Specialty Mfg. Co. list Jan. 1, 1902, 30¢ to 5¢

Sweepers, Carpet—

National Sweeper Co.:
 Auditorium, Roller Bearing (36 in. case), Nickel, \$54.00
 Mammoth, Roller Bearing (30 in. case), Nickel, \$60.00
 Marion, Roller Bearing, regular finishes, full Nickel, \$24.00
 Marion Queen, Roller Bearing, full Nickel, \$24.00
 Monarch, Roller Bearing, Nickel, \$22.00
 Monarch, Roller Bearing, Jap. ned, \$22.00
 Transparent, Roller Bearing, Plate Glass Top, Nickel, \$36.00
 Monarch Extra, Roller Bearing, (17-inch case), Nickel, \$36.00
 Monarch Extra, Roller Bearing (17-inch case), Japanned, \$33.00
 National Queen, Fancy Veneer, \$27.30
 Perpetual, Regular Bearings, Nkl, \$20.00
 Perpetual, Regular Bearings, Jap, \$18.00
 NOTE—Rebates: 50¢ per dozen on three-dozen lots; \$1 per dozen on five-dozen lots; \$2 per dozen on ten-dozen lots; \$2.50 per dozen on twenty-five-dozen lots.

Tacks, Brads, &c.—

List Jan. 15, '99,
 Carpet Tacks, 90¢ to 40¢ to 10¢ to 5¢
 American Cut Tacks, 90¢ to 25¢ to 5¢
 Swedes Iron Tacks, 90¢ to 30¢ to 10¢ to 5¢
 Swedes Upholsterers' Tacks, 90¢ to 45¢ to 10¢ to 5¢
 Gimp Tacks, 90¢ to 45¢ to 10¢ to 5¢
 Lace Tacks, 90¢ to 45¢ to 10¢ to 5¢
 Trimmers' Tacks, 90¢ to 30¢ to 10¢ to 5¢
 Looking Glass Tacks, 70¢ to 10¢ to 5¢
 Bill Posters' and Railroad Tacks, 90¢ to 45¢ to 10¢ to 5¢
 Hungarian Nails, 80¢ to 30¢ to 5¢
 Common and Patent Brads, 80¢ to 10¢ to 5¢
 Trunk and Clout Nails, 80¢ to 10¢ to 5¢
 NOTE—The above prices are for Straight Weights. An extra 5¢ is given Star Weights, and an extra 10¢ to 5¢ on Standard Weights.

Miscellaneous—

Double Pointed Tacks, 90¢ to 45¢ to 5¢
 Steel Wire Urads, R. & K. Mfg. Co.'s list, 50¢ to 10¢ to 60¢

See also Nails, Wire.**Tanks, Oil—**

Emerald, S. S. & Co., 30-gal. \$3.25
 Emerald, S. S. & Co., 60-gal. \$4.00
 Queen City S. S. & Co., 30-gal. \$3.65
 Queen City S. S. & Co., 60-gal. \$4.50

Tapes, Measuring—

American Asses' Skin, 40¢ to 10¢ to 50¢
 Patent Leather, 25¢ to 30¢ to 5¢
 Steel, 40¢ to 10¢ to 10¢
 Chesterman's, 55¢ to 25¢ to 5¢
 Faddy Asses' Skin, 40¢ to 10¢ to 5¢
 Eddy Patent Leather, 25¢ to

JUNE 1, 1904.

The following quotations are for small lots. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

Sheet and Bolt—

October 22, 1903,
Prices, in cents per pound.

Sheet 30 x 60.

Ins.	Not wider than	Not longer than	And longer than	64 oz. & over, gold sheet, 30 oz. to 64 oz. and heavier, 5 lb.	30 oz. to 64 oz. and 5 lb.	24 oz. to 30 oz. and to 25 lb.	16 oz. to 24 oz. 12½ to 16½ lb.	14 oz. and 15 oz. it to 12½ lb.	12 oz. and 13 oz. 9½ to 12 lb.	10 oz. and 11 oz. 7½ to 9½ lb.	9 oz. 6½ to 7½ lb.	Lighter than 8 oz.
72	72	18	19	19	19	19	19	20	20	22	22	24
74	74	18	19	19	19	19	19	20	20	22	22	24
76	76	18	19	19	19	19	19	20	20	22	22	24
78	78	18	19	19	19	19	19	20	20	22	22	24
80	80	18	19	19	19	19	19	20	20	22	22	24
82	82	18	19	19	19	19	19	20	20	22	22	24
84	84	18	19	19	19	19	19	20	20	22	22	24
86	86	18	19	19	19	19	19	20	20	22	22	24
88	88	18	19	19	19	19	19	20	20	22	22	24
90	90	18	19	19	19	19	19	20	20	22	22	24
92	92	18	19	19	19	19	19	20	20	22	22	24
94	94	18	19	19	19	19	19	20	20	22	22	24
96	96	18	19	19	19	19	19	20	20	22	22	24
98	98	18	19	19	19	19	19	20	20	22	22	24
100	100	18	19	19	19	19	19	20	20	22	22	24
102	102	18	19	19	19	19	19	20	20	22	22	24
104	104	18	19	19	19	19	19	20	20	22	22	24
106	106	18	19	19	19	19	19	20	20	22	22	24
108	108	18	19	19	19	19	19	20	20	22	22	24
110	110	18	19	19	19	19	19	20	20	22	22	24
112	112	18	19	19	19	19	19	20	20	22	22	24
114	114	18	19	19	19	19	19	20	20	22	22	24
116	116	18	19	19	19	19	19	20	20	22	22	24
118	118	18	19	19	19	19	19	20	20	22	22	24
120	120	18	19	19	19	19	19	20	20	22	22	24
122	122	18	19	19	19	19	19	20	20	22	22	24
124	124	18	19	19	19	19	19	20	20	22	22	24
126	126	18	19	19	19	19	19	20	20	22	22	24
128	128	18	19	19	19	19	19	20	20	22	22	24
130	130	18	19	19	19	19	19	20	20	22	22	24
132	132	18	19	19	19	19	19	20	20	22	22	24
134	134	18	19	19	19	19	19	20	20	22	22	24
136	136	18	19	19	19	19	19	20	20	22	22	24
138	138	18	19	19	19	19	19	20	20	22	22	24
140	140	18	19	19	19	19	19	20	20	22	22	24
142	142	18	19	19	19	19	19	20	20	22	22	24
144	144	18	19	19	19	19	19	20	20	22	22	24
146	146	18	19	19	19	19	19	20	20	22	22	24
148	148	18	19	19	19	19	19	20	20	22	22	24
150	150	18	19	19	19	19	19	20	20	22	22	24
152	152	18	19	19	19	19	19	20	20	22	22	24
154	154	18	19	19	19	19	19	20	20	22	22	24
156	156	18	19	19	19	19	19	20	20	22	22	24
158	158	18	19	19	19	19	19	20	20	22	22	24
160	160	18	19	19	19	19	19	20	20	22	22	24
162	162	18	19	19	19	19	19	20	20	22	22	24
164	164	18	19	19	19	19	19	20	20	22	22	24
166	166	18	19	19	19	19	19	20	20	22	22	24
168	168	18	19	19	19	19	19	20	20	22	22	24
170	170	18	19	19	19	19	19	20	20	22	22	24
172	172	18	19	19	19	19	19	20	20	22	22	24
174	174	18	19	19	19	19	19	20	20	22	22	24
176	176	18	19	19	19	19	19	20	20	22	22	24
178	178	18	19	19	19	19	19	20	20	22	22	24
180	180	18	19	19	19	19	19	20	20	22	22	24
182	182	18	19	19	19	19	19	20	20	22	22	24
184	184	18	19	19	19	19	19	20	20	22	22	24
186	186	18	19	19	19	19	19	20	20	22	22	24
188	188	18	19	19	19	19	19	20	20	22	22	24
190	190	18	19	19	19	19	19	20	20	22	22	24
192	192	18	19	19	19	19	19	20	20	22	22	24
194	194	18	19	19	19	19	19	20	20	22	22	24
196	196	18	19	19	19	19	19	20	20	22	22	24
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220	220	18	19	19	19	19	19	20	20	22	22	24
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232	232	18	19	19	19	19	19	20	20	22	22	24
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268	268	18	19	19	19	19	19	20	20	22	22	24
270	270	18	19	19	19	19	19	20	20	22	22	24
272	272	18	19	19	19	19	19	20	20	22	22	24
274	274	18	19	19	19	19	19	20	20	22	22	24
276	276	18	19	19	19	19	19	20	20	22	22	24
278	278	18	19	19	19	19	19	20	20	22	22	24
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292	292	18	19	19	19	19	19	20	20	22	22	24
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304	304	18	19	19	19	19	19	20	20	22	22	24
306	306	18	19	19	19	19	19	20	20	22	22	24
308	308	18	19	19	19	19	19	20	20	22	22	24
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312	312	18	19	19	19	19	19	20	20	22	22	24
314	314	18	19	19	19	19	19	20	20	22	22	24
316	316	18	19	19	19	19	19	20	20	22	22	24
318	318	18	19	19	19	19	19	20	20	22	22	24
320	320	18	19	19	19	19	19	20	20	22	22	24
322	322	18	19	19	19							

Common High Brass.	in.	in.	in.	in.	in.	in.	in.
Wider than	35	30	32	34	36	38	40
and including	28	30	32	34	36	38	40
To No. 30, inclusive.....	89	42	46	50	55	60	65
No. 31, 32, 33 and 34.....	40	43	47	51	56	61	66
No. 35 and 36.....	41	44	48	52	57	63	71
No. 37 and 38.....	42	45	49	53	58	65	75

* Special prices not less than 80 cents.
Add 1¢ for additional for each number thinner
than Nos. 28 to 33 inclusive. Discount from List....

Brown & Sharpe's gauge the standard.	Com. high brass.	Low brass.	Gold's brass and copper
All Nos. to No. 10, inclusive....	\$0.23	\$0.27	\$0.28
Above No. 10 to No. 16.....	.234	.274	.284
No. 17 and No. 18.....	.24	.28	.33
No. 19 and No. 20.....	.25	.29	.33
No. 21.....	.26	.30	.34
No. 22.....	.28	.31	.35
No. 23.....	.28	.32	.36
No. 24.....	.30	.34	.38
No. 25.....	.32	.36	.40
No. 26.....	.33	.39	.43
No. 27.....	.35	.43	.46
No. 28.....	.38	.46	.50
No. 29.....	.45	.49	.54
No. 30.....	.48	.52	.58
No. 31.....	.51	.55	.67
No. 32.....	.55	.59	.73
No. 33.....	.59	.63	.80
No. 34.....	.62	.68	.95
No. 35.....	.70	.74	1.30
No. 36.....	.76	.80	1.50
No. 37.....	1.00	1.04	1.70
No. 38.....	1.30	1.34	2.00
No. 39.....	2.00	2.00	3.25
No. 40.....	2.60	2.60	5.75

Discount, Brass Wire, 25%; Copper Wire, N.Y.
List November 16, 98.
Spring Wire, 24 2 2 advance.

Straight, but not turned, Rods, $\frac{1}{2}$ to 3 in. diameter, @
 D. net. 184
 Finished Piston Rods, $\frac{1}{2}$ to 2 $\frac{1}{2}$ in. diameter, @ D net, 194
 Other sizes and extreme lengths, special prices.

Duty: In Blocks 3¢ W.B.
 Western Spelter..... 5¢ @ 57¢
Zinc.
 Duty: Sheet 3¢ W.B.
 No. 9, base, oaks, 6½¢ | Open per, B..... 7½¢

Duty: Pigs and Bars and Old, 3/4¢ W B.	Pipe and
Sheets, 3/4¢ W B.	
American Pig	47¢ 5/8
Bar	53¢
Pipe	56¢ 5/8
Thin Lead	51¢
Block Tin Pipe	87¢ 1/2
Sheet Lead	61¢
Old Lead in exchange, 3/4¢ W B.	

14 & 16, guaranteed.....18% @ 19%
No. 1.....16% @ 17%
Prices of Solder indicated by private brand vary
according to composition.

Cookson.....	7	8087
U. S.....	7	674
Hungarian.....	8	061

Duty: Crude, 8¢ p. b.		Fls. Sheets, Bars and Rods, 13¢ p. b.	
No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting:.....			
Small lots.....
100-lb lots.....
No. 2 Aluminum (guaranteed to be over 99% pure), in ingots for remelting:.....			
Small lots.....
100-lb lots.....
Aluminum Sheet.....
Wider than.....
And including.....

No. 30	44	46	47
No. 31	44	46	49
No. 32	46	48	51
No. 33	46	50	53
No. 34	46	50	53
No. 35	47	51	54
No. 36	47	54	59
No. 37	49	57	63
No. 38	49	57	64
No. 39	49	60	69
No. 40	50	64	71

Larger than No. 9.....		No. 15.....	43¢
No. 9 to No. 10.....	40¢	No. 17.....	50¢
No. 11.....	41¢	No. 18.....	53¢
No. 12.....	41¢	No. 19.....	60¢
No. 13.....	42¢	No. 20.....	65¢
No. 14.....	42¢	No. 21.....	85¢

Dealers' Preheating Prices Paid in New York.	
Heavy Copper.....	104 1/2
Light and Tinned Copper.....	96 1/2
Light Brass.....	5 1/2
Lead.....	4 1/2
Ten Lead.....	38 1/2
Zinc.....	34 1/2
No. 1 Pewter.....	17 1/2
Pure Aluminum, Sheet, 1/4".....	21 1/2
Cast Aluminum, 1/4".....	19 1/2
Tin Plate Scrap.....	\$4.50/5.00
Wrought Scrap Iron.....	gross ton \$12.00/13.50
Best Pure Plate Scrap.....	gross ton \$10.00/11.00
Best Pure Plate Scrap.....	gross ton \$7.50/8.00
Best Iron.....	gross ton \$5.50/6.00

Tin-

Duty.—Pigs, Bars and Block.	Free.	Per 3
Bacon, Pigs.....	28%	@29½¢
Straits, Pigs.....	28%	@29½¢
Straits in Bars.....	29%	@30½¢

American Charcoal Plates.

American Charcoal Plates.

Calland Grade:	
IC, 14 x 20.....	\$6.85
IX, 14 x 20.....	7.85
Melyn Grade:	
IC, 14 x 20.....	5.85
IX, 14 x 20.....	7.10
Allaway Grade:	
IC, 14 x 20.....	5.10
IX, 14 x 20.....	6.20

American Coke Plates-Bessemer

IC, 14 x 90	108 D.....	\$4.20
IX, 14 x 90		\$5.20

an Torne

PC 20 x 28.....	\$8.30
PC 20 x 28.....	\$10.90

Copper=

DUTY: Pig, Bar and ingot and Old Copper free.

¶ 16.
Ingot—

Lake.....14% @ 14%ce

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